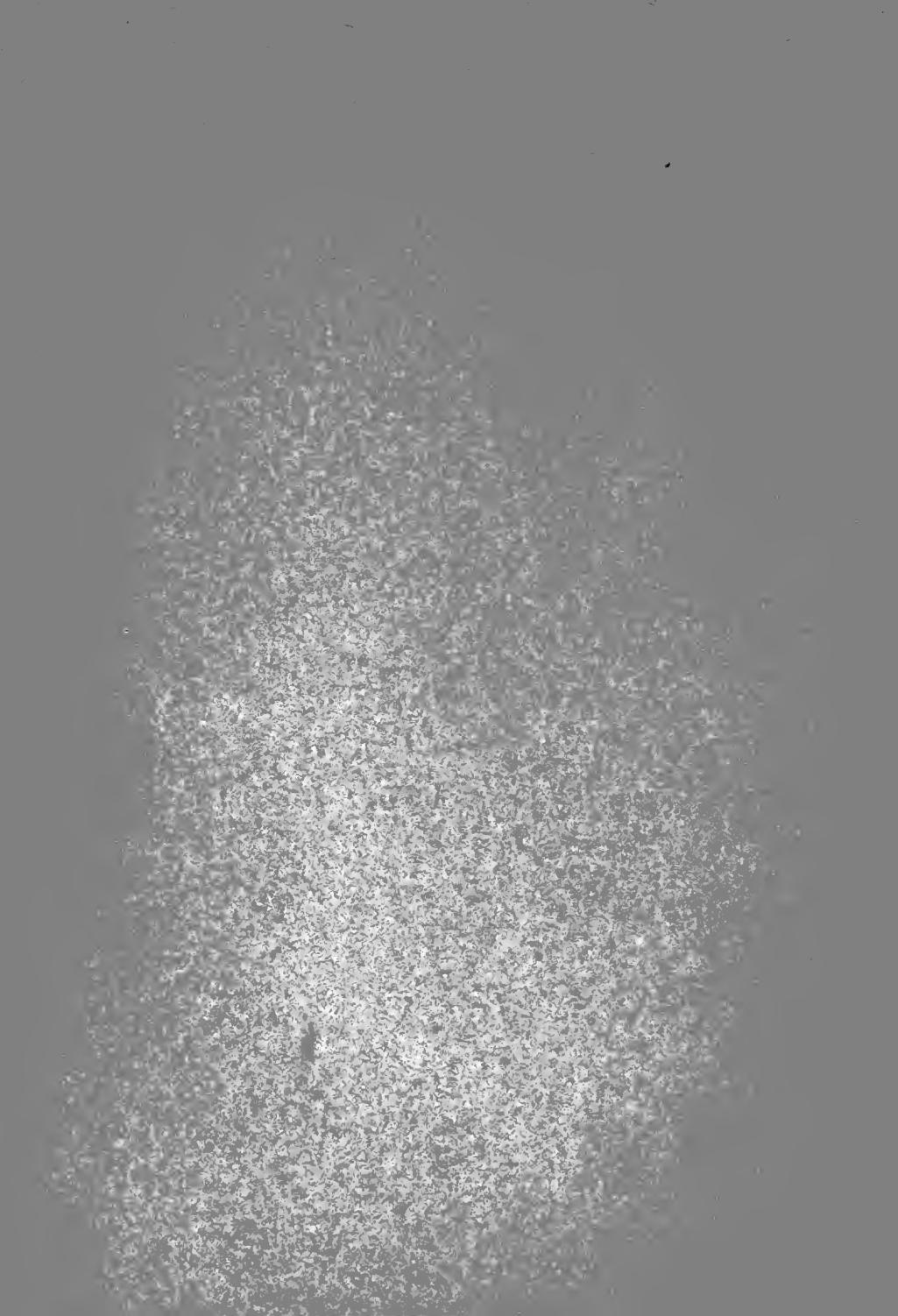
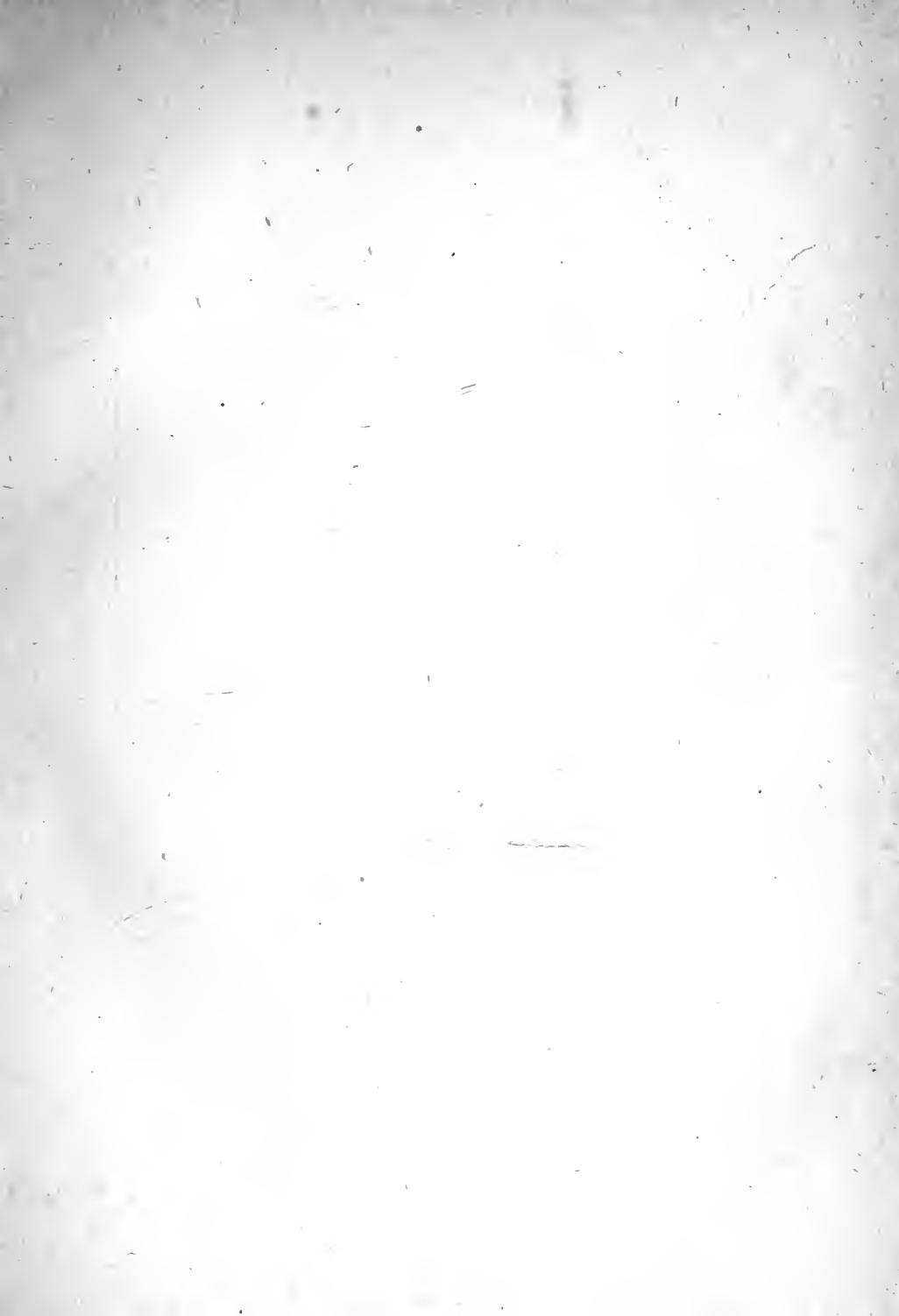


CEREBRAL HYPERÆMIA

HAMMOND

19.8.72





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CEREBRAL HYPERÆMIA

THE RESULT OF

MENTAL STRAIN OR EMOTIONAL DISTURBANCE

BY

WILLIAM A. HAMMOND, M.D.

Late Surgeon-General, U. S. Army ; Professor of Diseases of the Mind and Nervous System in the Medical Department of the University of the City of New York, and in the Medical Department of the University of Vermont ; Fellow of the College of Physicians of Philadelphia, and of the Academy of Arts and Sciences, Boston ; Member of the Academy of the Natural Sciences of Philadelphia ; of the American Philosophical Society ; of the New York Neurological Society ; of the American Neurological Association ; Corresponding Member of the British Medical Association ; Member of the Medico-Chirurgical Society of Edinburgh, etc., etc.

Read before the New York Neurological Society (in outline), Nov. 5th, 1877.

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P R E F A C E.

THE disease which is considered in the ensuing pages is more common, according to my experience, than any other affection of the nervous system. It is especially an outgrowth of our civilization, and of that restless spirit of enterprise and struggle for wealth so characteristic of the American people. It is an easily preventible disorder, not for this purpose requiring extensive hygienic operations, but simply the acts of the individual in using his or her brain with the same regard for its well-being as is ordinarily extended by the humane carter to the muscular system of his horse. The brain of man is strong : it will endure a terrible amount of ill usage ; but there are limits to the abuse which may be inflicted upon it with impunity, and few there be who do not pass them.

It is, perhaps, too much to expect the emotions to be entirely under the control of the individual, nor is it desirable that we should be reduced to the condition

of intellectual automata, moved always by reason and judgment and never by feeling. But it is entirely within the power of every one, by that self-discipline so seemly in all, to obtain such a degree of mastery over unworthy or excessive passions, as will prevent them dominating over the whole mind and body to the detriment of both.

Ill-regulated emotions are even more prolific of brain disorders than severe mental labor, and many a person considered to be suffering from what is called nervous prostration or exhaustion, is simply the subject of emotional disturbance and a consequent condition of cerebral hyperæmia.

The last few years have witnessed the death of many distinguished persons from the direct results of excessive brain-work, or the passional excitement so commonly produced in men and women by the multitude of causes in operation upon them. In the hope, that what I have written may tend to the prevention or alleviation of suffering, I send out this little monograph.

WILLIAM A. HAMMOND.

43 WEST FIFTY-FOURTH ST.,
NEW YORK, January 1, 1878.

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CEREBRAL HYPERÆMIA.

CHAPTER I.

INTRODUCTION.

THE condition in which the brain is left after very intense or protracted mental application, or as a consequence of powerful emotional disturbance, is one of very great importance, both as regards the immediate results to the individual, and as predisposing to subsequent disease. Up to the time of the publication, of a monograph of mine on Wakefulness,* nearly twelve years ago, the subject had scarcely attracted any attention; and even since then, the very few observations that have been made by others have been from wrong stand-points, and hence devoid of satisfactory therapeutical results. In subsequent writ-

* On Wakefulness, with an Introductory Chapter on the Physiology of Sleep. Philadelphia: 1865.

ings * I have insisted upon and amplified the views then enunciated, and in the present monograph I propose to reconsider at length the whole subject, embodying in the discussion the main points of a greatly enlarged personal experience as well as the results of some interesting observations recently made abroad.

That an increased amount of blood flows through the cerebral vessels during mental activity, that these vessels may become permanently over-distended, and that profound interstitial changes may thereby be eventually produced in the brain-substance, are facts in regard to which I have no question. The first two are capable of actual demonstration ; the last is a matter of inference, but of inference so very decided in its character as scarcely to allow of the existence of a doubt. What these changes are, and what relation they bear to the kind and degree of cerebral action, we are far from being able to determine.

Helmholtz,† several years ago, ascertained for

* *Sleep and its Derangements.* Philadelphia : 1869. On the Effects of Excessive Intellectual Exertion. *Bellevue and Charity Hospitals Reports.* New York : 1870. *A Treatise on Diseases of the Nervous System.* New York : 1871, and subsequent editions.

† *Muller's Archiv.*, 1843, p. 72. Also *Die Chemie der Gebeve*, von Julius Eugen Schlossberger, Erster Band. Leipzig & Heidelberg, 1856, p. 186.

muscles what we cannot with equal certainty determine for the brain. He amputated the legs of a frog, and, leaving one of them in a state of rest, excited the other to contractions by means of galvanism, continuing the current so long as the muscles retained their irritability. The flesh of the two limbs was then submitted to chemical examination with the result of ascertaining that the water-extractive was from twenty to twenty-five per cent less in the exercised limb than in the other, while the alcohol-extractive was correspondingly increased. I have repeatedly performed Helmholtz's experiment with similar results.

Such experiments show how profoundly the exercise of an organ modifies its structure.

Gulliver's observations lead to no important conclusion except that muscular rigidity ensues at a comparatively early period in animals hunted to death.

The effects of emotion over the solids and fluids of the body has long been known, and in some of its phases is a matter of every-day observation. Thus we see the vessels of the face and chest become surcharged with blood under the influence of anger or shame; the saliva of man may be changed from a bland fluid to a powerful poison through the effect of rage, and fear or horror converts the sustentant milk of the mother into a potion of deadly qualities. In fact, scarcely an organ of the body resists this influ-

ence altogether, and some exhibit it in a very marked degree. Even the muscles are subject to it, and may be profoundly changed in chemical constitution through emotional disturbance or physical suffering. Doubtless the primary effect is in all such cases produced upon the blood, but this does not lessen the value of the examples as analogical to what we have ample assurance, takes place in the structure of the brain from similar causes.

The influence of bodily suffering in rendering the blood poisonous, is very strikingly shown in the following account :

“ In order to procure a roast for Easter,” says Dr. Röser, “ C. in R. desired his family to set a snare for a roebuck. Accordingly one of these poor animals was caught in the snare, which, as its head and breast had passed through, held it by the hinder parts of the body, the abdomen and pelvis being enclosed in the cord, so that it must have succumbed after a most agonizing struggle. It was found dead the next day. The master and mistress of the family ate on Easter day the best part of this dainty ; the servants had little ; the remainder was laid in vinegar but not eaten.

“ On the same day all of the family who had eaten of the venison observed a striking dryness of the mouth, oppression of the stomach and nausea ; all complained of oppression of the head, giddiness, and

great weariness of the limbs. The master lost his sight for several days, and in short, there now began a series of remarkable symptoms requiring in many ways the assistance of Dr. Röser. The husband was only restored to health in July, but the wife never recovered. She lingered more than two years, and at last died after severe sufferings. The daughter, the man-servant, and the maid who had eaten little of the tortured animal, were soon cured. The symptoms in many respects resembled those of the effects of the bite of rabid animals (and of the sausage poison of Würtemburg?)”

Dr. Röser concludes his communication in these words :

“ Many an animal (for example in hunting) is tortured to death in the most barbarous manner like the roebuck in the snare. Ought not the medical police to be led by cases like this to adopt the strictest regulations to prevent the use as food of animals which have in any way been tortured to death, and to insure that the animals intended for food are not tortured before being slaughtered? ” *

Every one, too, has noticed the feeling of fatigue experienced after severe physical exertion. This is

* Dr. C. G. Carus in *Der Menschenfreund in seiner Beziehungen zur belebten Welt*, quoted by Liebig in his Familiar Letters on Chemistry, etc. Third edition, London, 1851. Appendix, No. 4, p. 531.

of course due to structural changes in the muscles as well as to nervous exhaustion. It is also well known that the flesh of animals hunted to death is stringy, unsavory, and that microscopical examination shows the fibrillæ of the muscles to be ruptured and separated from each other by minute extravasations of blood. In addition to these evidences of muscular change we have that afforded by the products of the waste of the muscular tissue—the *débris*, as it were, which appear in the urine, and enable us to measure with considerable accuracy the extent of the decomposition.

Now, in regard to the brain, somewhat similar results ensue from intellectual exertion and emotional excitement; and, although, as I have said, we cannot determine with any great degree of exactness, the nature or extent of the change produced, we are not altogether without important data which tend to give us some conception of what is going on. By means of various physical apparatus we are able to obtain approximately correct notions in regard to the quantitative state of the cerebral circulation, and a careful study of the symptoms aids us still further in arriving at exact ideas on the subject. We can also, after the manner of the chemist—who weighing the ashes left in the grate will tell us how much coal has been consumed—measure the waste of the nervous tissues and thus determine with an approximation to accuracy how

much brain has been decomposed in a given period. The two conditions are apparently inseparably connected. Whenever there is an increased amount of blood circulating in the cerebral vessels, there is at the same time an augmented waste of the cerebral substance.

Thus, several years ago desiring to ascertain the effects of excessive mental labor upon the brain as indicated by the excretion of urine, I performed a series of experiments upon myself by which it was clearly ascertained that the solid matter eliminated by the kidneys was notably increased in direct relation with the extent to which the brain was worked. All this was, for the time being at least, within the limits of health. But by persevering with the experiments and carrying the mental exertion to a still higher point, a stage would have been reached at which the decomposition of brain substance would have been greater than the formative processes, and then disease would have existed. I would have been living, as it were, on my brain capital instead of the income, and brain bankruptcy would have been only a question of time, just as it is in financial matters. This is exactly what people do with their brains continually. Overwork causes them to use up their brains faster than they make them, and as a consequence, that organ which of all others it is essential to keep in a healthy condition, becomes the seat of serious disease. To the

consideration of some of the consequences of inordinate brain action, I propose to devote the following pages.

CHAPTER II.

CEREBRAL HYPERÆMIA—SYMPTOMS.

THAT one of the primary effects of intellectual exertion or emotional disturbance is an increase in the amount of blood circulating through the brain, does not admit of a doubt, except from those who, still refusing to learn, contend that the cerebral circulation is not subject to variation under any circumstances. Experimental physiology has, however, determined this point so positively in the affirmative that it is scarcely necessary to adduce the evidence in its support. It will be sufficient to recall the numerous facts observed by others and myself with reference to the immediate cause of sleep, by which it is shown that during the condition of wakefulness the quantity of blood in the brain is much greater than it is during sleep; the first being a state of intellectual activity, the latter one of almost complete cerebral rest.*

* Those who desire further information on this and analogous points are referred to the writer's monograph entitled, *Sleep and its Derangements*, and to his *Treatise on Diseases of the Nervous System*, chap. i., on *Cerebral Congestion*.

Excessive mental exercise inordinately augments the activity of the cerebral circulation. The blood-vessels become over-distended, and if the brain be kept long in a condition of extraordinary action, they may be rendered incapable of returning spontaneously to their normal dimensions. Like a bladder filled to repletion with urine, they become in a manner paralyzed and unable to contract upon their contents. They lose, to a certain extent, their elasticity, and like the India-rubber band, kept too long around a large bundle of papers, they do not regain their natural size even when the distension is removed. A state of cerebral hyperæmia is thus induced which gives rise to a set of perfectly characteristic symptoms and which is fraught with peril to those in whom it occurs.

In a monograph published some four years ago, Dr. M. Krishaber* described a disorder of the brain and heart which is probably identical with the one under consideration, and to which, under the name of cerebral hyperæmia, or the prodromatic stage of cerebral hyperæmia, I called attention in the first edition of my Treatise on Diseases of the Nervous System, published in 1871. Krishaber's studies have very considerably advanced our knowledge of the subject, and as my own more recent investigations and enlarged experience have tended still further to the elucidation

* De la "névropathie cérébro-cardiaque." Paris : 1873.

of a very interesting and important condition of the nervous system, I have thought it would not be out of place to bring some of the more notable results of our labors to the notice of the Neurological Society. It may be as well, however, to state here at the outset, that I differ with Krishaber entirely relative to the pathology of the disorder we have both described, and that I am of the opinion that the cardiac symptoms upon which he lays great stress are really of quite secondary importance. In other respects there is no essential point of difference between us in the representations of an affection studied, independently of each other, and from altogether different stand-points.

The disease is sometimes developed with great suddenness, but ordinarily it advances little by little to completeness. When the former is the case the patient experiences, under the influence of great mental excitement, pain in the head, vertigo, an inability to speak, or at least imperfection of articulation. There are noises in the ears, flashes of light before the eyes, and occasionally for a short time double vision. The heart beats with increased force and rapidity and is more or less irregular in its action; the face is flushed, and a feeling of suffocation is experienced. If he attempts to walk, his gait is uncertain or staggering, not only in consequence of the vertigo present, but from actual loss of power in the limbs. Numbness is commonly felt in some part of

the body, and clonic spasms of the muscles, notably of those of the face, are generally present.

With all these physical symptoms there are others indicating mental disturbance. Chief among these are hallucinations, or illusions of the senses, particularly of sight and hearing. Insomnia is an almost invariable attendant, and what little sleep the patient obtains is interrupted by unpleasant or even frightful dreams. Gradually, the disorder becomes established, and then other functions, especially those connected with digestion, are deranged. From the first the urine is loaded with urates and phosphates.

As instances of the suddenness with which the disease may make its onset, I cite the following cases from my note-book :

F. H., a gentleman engaged in a manufacturing business which required all his attention to make it profitable, was informed one morning by his superintendent that a large lot of material had been spoiled. He at once experienced an intense sensation of vertigo, a sharp pain in the head, palpitation of the heart, and would have fallen had he not been supported by the bystanders. There were also a roaring sound in the ears and flashes of light before the eyes. On attempting to stand, the vertigo and palpitations were increased. There was at no time loss of consciousness, though the ideas were confused and the speech thick. In the course of a few hours the severity of

these symptoms diminished, but that night he was unable to sleep, and in the morning the morbid phenomena re-appeared, though with diminished violence. For several months afterward, he was troubled with wakefulness, a sense of fulness and tightness in the head, occasional weakness of the limbs, slight numbness and a total inability to exert his mind in his business affairs without an increase in all the symptoms. Under appropriate treatment he entirely recovered.

S. L., a book-keeper, after a day of unusually arduous work, left his place of business to go home. He had hardly taken half a dozen steps when he was seized with vertigo and fell unconscious on the sidewalk. He almost immediately regained his senses, but on trying to stand found that he was paralyzed in both legs, and that the least motion of the body brought on a return of the vertigo, which was now attended with pain in the head, mostly in the frontal region, noises in the ears and indistinctness of vision. On attempting to speak, his articulation was so imperfect that he could scarcely be understood. There was an uneasy feeling at the pit of the stomach, but neither nausea nor palpitation of the heart, though the action of this organ was irregular. He was taken home in a carriage, and after a sleepless night found himself very little better except in the fact that though his legs were still weak there was no absolute paralysis. Gradually he got somewhat bet-

ter, though walking always produced vertigo, and his gait was similar to that of a partially-drunken man, as he found it impossible to avoid a zigzag course, or a decided tendency to sidle over to the edge of the pavement. Sleep was almost every night imperfect, being disturbed by dreams of difficulties from which he could not extricate himself, such as the house being on fire, and on his springing from bed discovering his door to be locked on the outside ; falling into the water and being on the point of drowning from inability to divest himself of heavy boots, and so on. Mental application was impossible without leading to an aggravation of all his symptoms, and the least emotional excitement was sufficient to augment them to a high degree. He suffered in this manner for nearly a year, before relief was obtained, being in that time treated with remedies directed to the removal of cerebral anaemia, when in fact the intracranial condition was directly the opposite.

M. S., a young lady, aged 19, and without notable predisposition to neurotic disturbances, was deeply chagrined at not being invited to a ball at which she had confidently anticipated being present. While talking the matter over with some friends she suddenly experienced a severe pain in the head, vertigo, noises in the ears, flashes of light alternating with darkness, and violent palpitation of the heart. At the same time a peculiar thrilling sensation was felt

throughout the body, especially on the left side. These symptoms continued with great intensity all that day, notwithstanding that stimulants and antispasmodics were administered in large quantities by the physicians called to attend her. During the night, every attempt to turn over in bed was attended with vertigo and palpitation of the heart. For over a year there was very little improvement, and the course of the disease was not essentially different from the other cases cited. The most distressing symptom in her case was the persistence of the insomnia, it rarely happening that she obtained over an hour or two of unrefreshing slumber. When she came under my care some thirteen months after the inception of the disease, I found that the affection, though mitigated in the violence of the attendant phenomena, was still sufficiently distressing to impair her capacity for enjoyment and her usefulness to others. Recognizing the existence of congestion of the brain rather than anæmia, for which she had uniformly been treated, I acted accordingly, and had the satisfaction of seeing her gradually improve till, at the end of less than six weeks, she was as well as she ever had been in her life.

These cases are cited not as exhibiting perfect representations of cerebral hyperæmia, but merely for the purpose of illustrating the suddenness with which the condition may be induced. They are selected at

random from many others occurring in my hospital and private practice, and detailed in my note-book.

Eventually, no matter how *brusque* may be the development of the symptoms, the course of the disease is not materially different from that of the more gradually established form next to be described. Indeed there are no differences except as regards the order of sequence in which the symptoms ensue and in the fact that in the present form, there is, in the beginning, a greater degree of intensity in the abnormal manifestations.

In the majority of cases, therefore, the affection is evolved more slowly and the order of appearances of the phenomena somewhat different.

Wakefulness is generally the first symptom indicative of cerebral disturbance, and this may be of all degrees from the loss of an hour or two of sleep to the passing of night after night in a state of complete insomnia. Even if sleep be obtained in some cases, it is disturbed by nightmare and frightful dreams, and the patient accordingly rises feverish, unrefreshed and entirely unfit for mental or physical exertion.

Upon endeavoring to apply himself to mental labor, he finds it difficult to fix the attention, and the effort to do so, or to obtain correct ideas of even simple matters, almost invariably increases the pain or uneasiness felt in the head. I think these phenomena are especially observable in those who have to

deal with arithmetical questions. The most accurate accountant is unable to add up a column of figures without making errors, of which in health he would be incapable. Repeated attempts in this direction render the task more and more difficult, and aggravate the mental confusion and physical discomfort. Indeed, so great is the disturbance thus induced that at times, utter despair takes possession of the mind. In a case of the disease under notice, occurring in a gentleman holding a prominent position in a bank of this city, an attempt at suicide was made, solely because of the chagrin induced by the inability to obtain a correct result in the addition of a number of figures.

The progress of the affection is indicated by additional evidences of mental derangement. The *memory* in regard to recent occurrences and the names of persons and places is notably weakened, and occasionally there are other aphasic symptoms, such as substituting one word for another of similar sound, or imperfectly pronouncing words consisting of two or more syllables. Thus, a patient spoke of his slippers as "flippers," another, well educated, alluded to sexual intercourse as "sectional" intercourse, and a third, who was at the time suffering also from haemorrhoids, repeatedly spoke of his fundament as his "condiment."

The *judgment* is weak and vacillating, the most strongly expressed determination is changed appar-

ently without reason, and again, there is an impossibility of arriving at a decision, in cases where ordinarily, but little reflection would be necessary. I have known a patient suffering from the disorder in question, take several thousand dollars every day for a month or more, to Wall Street, fully resolved, when he left his house, how to invest his money, but always returning with his purpose unfulfilled—a prey to doubts for which he could give no sufficient cause even to himself.

Illusions, hallucinations or delusions, may be present, but are not usually fixed; and the patient will often laugh at the absurd images he has seen, voices he has heard or ideas he has entertained not five minutes before. Persons thus affected will often reason clearly in regard to apparitions or voices of the unreality of which, they are fully sensible.

A condition very often present is a *morbid apprehension of impending evil*, for which there is no assignable cause, and the nature of which the patient can rarely define. He is sure something will happen to him, but what, he does not know; or if he does designate the form of trouble to ensue, he changes from one kind to another without any more reason than he had for the erroneous idea in the first place. Again, he is afraid that he may do some injurious act either against himself or others, and is hence fearful of being left alone. One patient was afraid to cross the ferry from Brooklyn lest he might be tempted to

throw himself off of the boat ; another kept away from railway tracks, fearing that he might be led by the sight of a passing train to put himself in the way of the engine ; another begged his wife to lock up his razors ; and another would not take a warm bath under the apprehension that he might neglect to turn off the hot water in time. It would be easy to enumerate very many more like instances. They remind us of "morbid impulse," but the subjects unlike those of this last-named condition, never yield to the excitation. In fact it is not an impulse but the fear of an impulse by which they are influenced.

The *emotional system* participates in the general mental disturbance, and indeed is often the part of the mind most prominently deranged. The passions are easily roused into activity by slight exciting causes ; trifling circumstances produce great annoyance, and the little every-day troubles of life appear of vast importance. The disposition accordingly becomes suspicious, peevish and fretful. Persons thus affected are very far, ordinarily, from being pleasant companions. Many of them avoid social intercourse, and shut themselves up in their rooms to brood over their real and imaginary disorders. Others, again, plunge into dissipation and excesses of every kind, in the vain expectation of being able by such means to overcome the disease ; and again, others strive, by a constant change of one physician for another, or the

substitution of one quack medicine for another equally quackish, to get relief from their mental and physical distress. In some, there are very few decided symptoms present, except the inability to sleep, and the incapability of concentrating the mind upon an object of study or labor, without inducing pain or discomfort of some kind in the head.

In all, however, there is the same *mental introspection*. Every symptom is exaggerated ; and if one with which the patient has suffered should happen to be absent, he is dissatisfied till it makes its appearance again, or till he has, by concentration of his mind on the subject, brought it back, and with it an aggravation of all the other phenomena. "Doctor," said a gentleman to me a few days since, "I am afraid I am getting worse, for last night I slept several hours, and if stupor should set in, I suppose it would be bad." Another, who had for several months suffered from an almost perpetual pain in the head, was quite sure sensibility was being destroyed when he found himself a whole day without it.

This fixing of the attention upon the body, is of course apt to develope symptoms which would otherwise, doubtless, never make their appearance ; and scarcely a day passes that instances in point do not come under my observation. The experiments of Mr. Braid in this direction are very instructive, and will bear quotation in the present connection. He

requested four gentlemen, whose ages varied from 40 to 56 years, and who were in good health, to lay their hands, palms upwards, on a table, and to look at them fixedly for a few minutes. They were not to speak, but were, as far as possible, to concentrate the attention on the upturned palms, and to await the result. In about five minutes one of these gentlemen, a member of the Royal Academy, said that he felt a sensation of great cold in the hand ; another, an author of distinction, said that at first he thought nothing was going to happen, but at last he felt a darting, prickling sensation, as if electric sparks were being drawn from the hand ; the third, late mayor of a large city, reported that he felt a very uncomfortable sensation of heat come over the hand ; and the fourth, secretary to an important association, had become rigidly cataleptic, the arm being firmly fixed on the table.*

Speaking of this subject, Sir Henry Holland † says :

“ One limb, for instance, or even a single finger, or a portion of the sentient surface of the body, may be taken for observation, and the results tested and checked by means wholly independent of the subject

* For many illustrations of the power of the attention over the body, the reader is referred to the author’s “Spiritualism, and Allied Causes and Conditions of Nervous Derangement. New York: 1876.

† Chapters on Mental Physiology, p. 24. London: 1852.

of experiment, a point often very important to the truth of the result.

"We have here, as in other parts of the inquiry, to look to the respective cases of attention directed by express volition, or suggested by some outward cause acting on the mind. In the former and more simple case, if a limb be taken for experiment, a peculiar sense of weight, with a vibratory tingling, or sensations approaching to cramp, are produced by the consciousness concentrated upon it. It is difficult to describe by words, feelings of this nature, evanescent or changing at each moment, and different doubtless in different persons ; but probably the closest resemblance is to those produced in ordinary cases by muscular fatigue or stagnant circulation through the limb. There is reason, indeed, to suppose, that the muscular structure is actually affected in these cases, and frequently even by particular conditions of movement, though not volitional in kind."

Medical men are said, and doubtless with truth—as many cases will occur to the mind of the professional reader—to be particularly liable to be affected with the diseases to which they have given special attention ; and every winter, during my course of lectures on the nervous system, I am consulted by medical students, who imagine themselves to be the subjects of the diseases I have brought to their notice ; and in some cases with reason. Under another divi-

sion of the subject, I shall have occasion to return to this matter for further consideration.

It follows from what has been said, that if well persons are liable to contract diseases through mental concentration, the subjects of cerebral hyperæmia must be peculiarly prone to the extension of their morbid symptoms through a like influence, and in fact this is exactly what occurs. A slight accidental sensation in some part of the body engages the attention, and becomes a fixture in the clinical history of the patient. Neuralgic pains, numbness, spasm, and even paralysis, may be thus induced, to say nothing of functional disturbances of the several organs.

Under this latter head there is none more frequently met with than what for a want of a better name may be called false impotence. To the production of this condition the erroneous ideas which prevail relative to spermatorrhœa and the fears excited by the advertisements and books of unprincipled quacks largely contribute. Indeed, it is rarely the case, that a male patient affected with cerebral hyperæmia does not at some time or other of its course imagine that he is impotent, and the only grounds he has for this notion are the facts that he has an occasional nocturnal emission, or the exudation of a little urethral mucus under the influence of sexual excitement. Still the fact is not to be overlooked that the predominance of this idea is extremely prejudicial to the patient's

well-being, and it is therefore important that the physician should, by obtaining his confidence and enlightening his ignorance, dispel the delusion at the earliest possible moment.

In addition, there are certain physical symptoms of disordered cerebral action which by their prominence force themselves into notice. Thus there are *pain*, *heat*, a *feeling of fulness* or of *distension* in the head, the sensation as if a *tight band* encircled it or the impression of a *dragging* or *clawing* character at the vertex. *Vertigo* is, however, the most prominent of all this category of phenomena in the majority of cases, and may be so severe as to prevent the patient moving about. In one case recently under my charge, the subject, a gentleman of about forty years of age, was often seized with intense vertigo while walking in the street, and was obliged at such times to seize hold of a lamp-post, or, if this was not within reach, to sit down on the nearest door-step, or even the curbstone, till the violence of the attack had in a measure abated.

Again, the least movement of the body, the slightest attempt at mental exertion, or the most trifling emotional disturbance is sufficient to excite it. At times it is clearly aggravated by indiscretions in diet or the ingestion of even a small quantity of any stimulating liquor, and at others is present during the whole period of being awake. There are two kinds

of this vertigo. In one the patient seems to be in motion ; in the other the objects about him appear to be tumbling topsy-turvy around him. In the latter the ground in front appears to rise up to meet him, and hence he walks as if ascending a hill. In some cases the two conditions co-exist or may alternate. Probably no symptom is more distressing than this. It almost invariably excites more fear of serious consequences than in reality should attend it, and it prevents the patient taking that bodily exercise so conducive to his restoration to health. In some cases, however, it is entirely absent, though such are, I think, rarely met with, and, no matter how intense it may be, is scarcely ever accompanied by nausea.

In other cases *headache* constitutes the chief physical feature of the disease, and even when not predominant is a more or less constant attendant on the morbid condition. It may be very severe, unfitting the sufferer for the slightest mental or physical exertion, or may consist of a dull, aching pain, very wearing but yet bearable. It is aggravated by any effort to use the mind or body, and especially by any cause, such as a dependent position of the head, the use of stimulating ingest, a constriction about the abdomen, chest or neck—likely to increase the amount of the intra-cranial blood.

In some cases there is no actual pain except as the immediate consequence of some one or other of

the existing causes mentioned ; but the patient is always conscious of an uncomfortable sensation in the head, which if not a pain, is capable of being readily converted into one. This is, as I have said, sometimes a mere feeling of fulness or tightness, or as if the brain—so a patient described it—"were being gathered together into a heap," or, as another said, were "being scratched with a claw." Again there is the impression that the head is exactly balanced on a very sharp point, and that some effort is required to keep it from falling off.

Usually the painful sensations in the head disappear towards night, or on the attempt to sleep, but resume their violence as soon as the patient awakes in the morning.

The special senses could scarcely be expected to escape giving evidences of derangement, and hence among the chief manifestations of the intra-cranial disorder are those connected with the perceptive organs.

Thus there are noises in the ears such as roaring, rumbling or singing, and occasionally loud reports such as might be produced by the discharge of fire-arms. A gentleman recently under my care for the affection in question, informed me that when he first experienced the sensation mentioned he was sitting in his library, quietly reading, when he suddenly heard a report as if a pistol had been shot off within a foot of his head.

He jumped to his feet, expecting to see an assailant behind him, but to his surprise there was no one to be seen, and it was very evident that no explosion had taken place. He was greatly astonished at this, but attributed the whole matter to an exaggeration, excited by his irritable nervous system, of some street noise. He had no further experience of the kind till the following morning, when on rising from bed after a wretched night of sleeplessness, he again heard the sound, and this time it was as nearly as possible like the noise produced by striking two stoutly bound books together close to his ears. After this there was scarcely a day that the sound was not heard. It was entirely subjective, as persons in close proximity to him at the time, heard nothing.

Several such cases have come under my observation. It is not in all that the sound appears to be in the ears. In some it has seemed to be located in different parts of the head, generally, however, in the posterior region.

In some cases patients have experienced the sensation as if something snapped or gave way within the head, and this has, in a few rare instances, been attended with the sudden disappearance of some of the more striking symptoms. Thus, a young lady, in consequence of an intense emotion, was seized with sudden vertigo and pain in the head, and fell to the floor unconscious. Recovering her senses in a few minutes

she found herself unable to speak a word, though she uttered in an excited way inarticulate sounds having no resemblance to speech. This condition continued for several hours, when she suddenly felt "something snap" in the head, and she instantly recovered the power of talking. The vertigo, pain in the head and other symptoms, persisted for two or three months afterwards.

In another case the onset of the disease in a gentleman who had for many years overworked his brain was extremely sudden, and was attended with facial paralysis. I treated him for this latter condition with electricity, with but little benefit; but one day he struck his head violently against a gas-burner hanging over his desk, and shortly afterwards felt something give way within his head with a sharp snapping sound, and the paralysis instantly disappeared, after having lasted some five or six days.

Such cases are in the present state of our knowledge inexplicable.

The ear becomes hyperæsthetic, and loud noises are therefore disagreeable. At times the sense of hearing is morbidly acute, while at others it is markedly impaired. Sounds are misinterpreted with some persons and illusions result. This is especially the case at night, when the patient is lying awake, the mind stretched to its utmost tension. A gentleman informed me that a circumstance with

which most persons are familiar—the conversion of the sound of the ticking of a clock into some phrase or other—was to him a matter of agonizing weariness. Night after night as he lay in bed, the ticking of a large clock in the hall seemed to be the constant repetition of the word “farewell.” Not wishing to reveal the matter to others, he endured for many nights the consequent suffering, till finally he made an excuse for leaving the city. But still the wheels of the railway cars seemed to be uttering the word “farewell,” and it was only after a fatiguing journey to Baltimore and repose in a quiet room that he escaped the infliction.

In addition to illusions, hallucinations of hearing are not uncommon and are usually in the form of whispered words which the patient hears with as much vividness as though they were real utterances. Like the misinterpretations of real sensorial impressions, these are usually experienced at night, and may be excited by any circumstance, mental or physical, which tends to increase the amount of blood circulating in the intra-cranial vessels. Thus, a powerful emotion, an unusually severe mental task, a strong muscular effort, or a dependent position of the head may induce them. In one case, that of a gentleman of rather obese development, a whisper of some kind or other was always heard when he stooped to button his gaiter-boots. In another, straining in the water-

closet frequently caused a like symptom. In one very interesting instance the sounds were like those of musical instruments, and were arranged into familiar tunes, to the no small satisfaction of the subject ; and in another they assumed the similitude of the bark of a dog. Occasionally they are in the form of commands to perpetrate some act of violence, such as suicide. A patient who came from Brooklyn to consult me heard a voice whispering in his ear and ordering him to throw himself into the river. "What is the use of your going to see a physician ?" it said. "The best thing you can do is to kill yourself. You are of no service to yourself or any one else. Jump overboard and end the matter at once." Though these hallucinations never imposed upon the reason of the patient, they were nevertheless sufficiently distressing, giving rise as they did, to the fear that he might, some day or other, be influenced by them to commit an act which he abhorred.

The aural speculum is almost, if not quite, as valuable as the ophthalmoscope in affording important information relative to the affection under notice ; and I have been in the habit for the last five years of employing it in every case presenting the more obvious features of the disease. I do not mean to be understood as intimating that positively affirmative results are to be obtained in all instances, but neither are they of any other single symptom. That the tympanum

does afford an indication of the state of the intra-cranial circulation, is sufficiently evident from a consideration of the experiments performed by my friend Prof. Roosa and myself * relative to the influence of the sulphate of quinine, the results of which have been amply confirmed by the subsequent investigations of Prof. Roosa, as well as by those of other observers.

In the cerebral disorder under notice evident congestion will almost always be observed of the vessels over the handle of the malleus, and the tympanum will be seen to be of a light pinkish color. In some cases we are prevented making the usual examination owing to the accumulation of cerumen. This must be removed by forceps or by washing, and the inspection deferred till next day.

I may add that physicians wishing to observe the connection between cerebral hyperæmia and tympanic congestion have a ready method of satisfying themselves on this point by examining the tympanum before and after the subject has inhaled a few drops of the nitrite of amyl. This was first done, so far as I am aware, by Mr. Galton, † and detailed in his paper

* The Influence of the Disulphate of Quinine over the Intra-Crania. Circulation. *Psychological and Medico Legal Journal*, October, 1874, p. 230.

† West Riding Lunatic Asylum Medical Reports, vol. iii., 1873, p. 258.

entitled, "Notes on the Condition of the Tympanic Membrane in the Insane."

The *faculty of vision* is almost invariably more or less disturbed. Sometimes there are bright flashes of light from over excitation of the retina, and these, like the other symptoms, are rendered more intense upon mental or physical exertion. At other times dark spots, *muscæ volitantes*, render the vision indistinct; and again there is the appearance of an undulatory vapor, such as is seen around a hot stove, or on a plain heated by the sun.

The conjunctivæ are suffused. The pupils contracted. There is intolerance of light, and motion of the eye-balls is painful, and the ophthalmic symptoms are aggravated by the effort to use the eyes. The ocular muscles easily become fatigued, and hence pain is excited by any attempt to read or to adjust the visual foci for near objects.

Ophthalmoscopic examination shows the arteries of the retina to be increased in size and tortuosity, and vessels which in health are not visible are now clearly perceived. The optic disk is often more or less congested, exhibiting the appearance to which Allbutt has applied the name "Congestion Papilla," but which is perhaps more generally known as "choked disk." The tint of the choroid is deeper than it is when in a normal condition.

The effect of cerebral congestion in giving rise to

visual hallucinations has long been known, though it often happens that in practice the value of the facts as an indication of the state of the intra-cranial circulation, is in a great measure disregarded. In another work* I have considered the subject of hallucinations of sight at some length, and as showing the influence of undoubted cerebral congestion, in producing them, I quote the following case which occurred in my own experience :

“A gentleman under the professional charge of the writer can always cause the appearance of images by tying a handkerchief moderately tight around his neck, and there is one form which is always the first to come and the last to disappear. It consists of a male figure clothed in the costume worn in England three hundred years ago, and bearing a striking resemblance to the portraits of Sir Walter Raleigh. This figure not only imposes on the sight but also on the hearing; for questions put to it are answered promptly.”

“A similar instance is related in Nicholson’s Journal. † ‘I know a gentleman,’ he states, ‘in the vigor of life, who, in my opinion, is not exceeded by any one in acquired knowledge and originality of deep research; and who for nine months in succession was

* Spiritualism and Allied Causes and Conditions of Nervous Derangement. New York, 1876, p. 8.

† Vol. vi., p. 166.

always visited by a figure of the same man, threatening to destroy him, at the time of his going to rest. It appeared upon his lying down and instantly disappeared when he resumed the erect position.' "

A case somewhat like the first of the two foregoing is referred to by De Boismont,* in which an individual was able to obtain hallucinations of sight by inclining his head a little forward. By this movement the return of blood from the interior of the cranium was prevented, and hence a state of repletion favorable to the production of hallucinations was induced.

Now, in the state of cerebral hyperæmia which results from excessive brain-work or intense emotional disturbance, a condition exists not essentially different from that present in the case referred to, except in the circumstance that the excess of blood is mainly arterial instead of venous, and that hence the congestion is more active than passive. But it must be borne in mind that it requires a very great degree of hyperæmia to cause the production of visual hallucinations, and therefore that we are not to expect them to occur in all patients who are its subjects. So far as my own experience extends, only about one in five exhibits the symptom with any degree of distinctness.

* History of Dreams, Visions, Apparitions, etc. American edition. Philadelphia : 1835.

Double vision is occasionally a phenomenon of the disease in question, though it is generally transient, and as Krishaber remarks, ordinarily only manifested in regard to bright objects.

This author also speaks of a peculiarity of sight which has not come under my notice. "A patient," he says, "looks at himself in a glass with astonishment, as if he had forgotten his appearance. Another is horrified at his image, which represents a being altogether of different traits from those which he conceived himself to possess. But he is not alarmed, for he knows that it is only his perception which is changed. This aberration exists not only as regards his own person, but other objects as well. The patient finds men and things changed; he is astonished, always astonished, and it seems to him that he is a being transported to another planet." *

The *sense of smell* is very often lost, perverted, or intensely exalted. Perhaps the second named of these changes is the one most frequently met with. I have a patient now under my care, a gentleman, who from over-mental work is suffering from cerebral hyperæmia, and who constantly while awake smells the odor of illuminating gas. So strong is this, that he is at times unable to resist the impression that gas is escaping somewhere, and he goes from burner to burner of his residence and office seeking for the im-

* Op. Cit., p. 168.

aginary leak. Another is constantly sensible of the smell of turpentine or new paint, and another has the odor of mint constantly present in his nostrils.

The *taste* is also occasionally affected in like manner, usually, so far as my experience goes, in the way of perversion. "Things don't taste as they used to," is a common complaint, and the saliva and buccal mucus often give the gustatory impression of other substances. It is not at all unlikely, however, that "the bad taste in the mouth," so often mentioned by patients, is due to a real change in the properties of the saliva or mucus. I have observed several cases in which any mental or emotional strain was sufficient to cause a bitter or other unpleasant taste in the mouth, and the same phenomenon is quite common as a consequence of gastric disturbance. Krishaber cites two cases in which both smell and taste were entirely abolished.

Sensation and the power of motion are usually affected, and generally, though not always, on one side of the body only. Thus, the arm or the leg feels heavy, and a feeling as of ants crawling over it, pins and needles sticking in it, or, as if the limb were "asleep," is experienced. Sometimes these sensations are confined to the face, the muscles of which feel drawn or tight and the skin of which has the various indications of anesthesia, mentioned. Most frequently, however, they are, I think, experienced on the

scalp, giving rise to the several sensations already mentioned.

Again, there is an exaltation of the sensibility of the skin and of the sensory nerves generally, and thus neuralgic pains are felt in various parts of the body ; or the cutaneous surface is extremely sensitive to the impression made upon it, whether of heat, cold or slight pressure.

Slight convulsive actions or twitchings of individual muscles or groups of muscles are generally present. Sometimes a few fibres only are affected. The face, and especially the eye-lids and angles of the mouth, are particularly liable to be thus involved. The muscular strength is usually weakened. The patient tires after slight physical exertion, and occasionally certain muscles, such as the deltoid and tibialis anticus, become distinctly paretic, so that there is an impairment of the ability to raise the arm from the side or to elevate the foot sufficiently high in walking, to clear ordinary inequalities in the pavement. The dynamometer shows the grasp of the hand of one or other side, or of both, to be weakened, and the line made by the dynamograph is zig-zag or uniformly depressed.

The *appetite* is capricious, and the *stomach* acts imperfectly and sluggishly. The gastric juice is not secreted in sufficient quantity for the purposes of digestion, and the peristaltic action of the stomach

being weakened, the food remains within it a long time undigested, and undergoing fermentation. Regurgitations, both of the solid contents and of gases, are common, and the patient tastes his meals several hours after they have been swallowed. Gases accumulate in the stomach and give rise to the sense of fulness experienced even after a very slight repast has been taken. Such symptoms are usually classed under the name of "nervous dyspepsia," a not improper designation, if it does not lead us into the error of regarding them as of primary importance instead of considering them as they are, merely consequent on the head trouble.

The *bowels* are ordinarily costive, though at times this condition alternates with diarrhœa.

The *urine* is in some patients scanty and high colored, in others it is profuse and almost as pale as water. Oxalate of lime is often present, and an excess of phosphates an invariable condition, so far as my experience extends. I have already spoken of this circumstance. Whether or not, the phosphates in the urine are to be regarded as the ashes of the nervous system and hence a measure of the amount of nerve tissue decomposed, there is no doubt that they are inordinately increased after intense mental or emotional strain.

I have spoken of the heat of the head of which the patient generally complains. That there is a real

increase of temperature can often be perceived by the hand or by the use of an ordinary thermometer. But in some cases the actual rise of temperature is so slight notwithstanding the feeling of heat which the patient experiences that we cannot detect it by either of these means. In such cases resort should be had to the thermo-electric differential calorimeter of Lombard, by which very minute changes of temperature can be detected, and the part of the brain in which the temperature is highest be readily ascertained. The experiments of Lombard, performed several years ago, show very beautifully the influence of cerebral action in augmenting the external heat of the head, and it may be remembered, that over two years ago I detailed to the Neurological Society the results of some experiments of my own in the same direction. For several years past I have never examined a patient presenting the more obvious features of cerebral hyperæmia without carefully determining the surface temperature of various parts of the scalp. At times and in some regions the elevation reaches two degrees of centigrade above the normal standard.*

* Since the above was written I have become acquainted with some recent experiments of Prof. Broca, of Paris, in the same direction. As he does not refer to either Lombard's or my own experiments, though the former (*Experiments on the Relation of Heat to Mental Work*) were published in the *New York Medical Journal*, January, 1867, p. 198, and a synopsis

But one of the chief categories of symptoms remains to be considered—chief at least, so far as the more obvious appearances go, though like the other visceral derangements, I must regard these as being due to the brain disorder—and that is the group of phenomena connected with the heart. To Krishaber, in the work already cited, belongs the credit of being the first to call attention to this remarkable series, for in the publication of my own to which I have referred, it was in a great measure overlooked. As Krishaber remarks, the troubles of the circulation consist especially in an irritability of the vascular system, so that the least movement, such as rising erect from the sitting posture, or to the sitting from the recumbent, leads to an acceleration of the pulse of from 20 to 30 or even 40 beats a minute. Besides this, there are frequent and violent palpitations either spontaneous, or provoked by the most insignificant causes, either mental or physical.

Emotional excitement is, however, the most prominent of my own in the *Journal of Nervous and Mental Disease*, January, 1876, I presume he is unacquainted with either. Prof. Broca ascertained by means of thermometers, applied to different parts of the scalp, that the external temperature was affected by different internal morbid, and physiological conditions, and hence confirmed the previous observations of Lombard and myself. His experiments would have yielded much more delicate and accurate results if he had employed Lombard's instrument.

lific cause of cardiac disturbance in patients affected with cerebral hyperæmia, and at times leads to serious results. The pulsations of the heart may be so irregular and the action of the organ so strong as to induce grave interference with the respiratory apparatus. Upon one occasion a lady, while in my consulting room, was seized with a paroxysm of the kind in question, of so severe a character that for a moment or two I thought she was about to die. For several months she had been wakeful, had suffered from vertigo and slight pain in the head, and while relating to me her symptoms, a blast near by, where a cellar was being excavated, exploded and produced so violent and sudden a shock as to bring on the excessive cardiac action mentioned. The heart throbbed with so great a degree of violence that its pulsations could be readily seen through her dress and heard at the distance of two or three feet; her face and neck became livid, and gasping for breadth, she fell to the floor insensible. In a very short time, however, the inordinate movements ceased and she recovered consciousness.

Physical examination of the heart fails in these cases to reveal the existence of any organic lesion.

In the intervals between the paroxysms of inordinate cardiac action, the pulse is small, often slow, soft, compressible, but by no means regular, either in force or frequency. Interruptions of the beats are com-

mon phenomena, and give rise to anxiety and morbid apprehensions in the patient.

Krishaber states that at the very beginning of the disorder there is sometimes present a series of phenomena simulating fever, such as a chill, followed by a distinct period of febrile excitement. During this last stage the temperature of the body is elevated almost half a degree centigrade, or nearly a whole degree of our scale, and may even be double this. This accession may be repeated with some degree of periodicity, but it soon ceases, and does not reappear after the full development of the disease.

I have observed this condition in about one-third of the cases that have come under my observation, though usually, close questioning is necessary to elucidate the fact of its existence, so little impression does it make upon the mind of the patient. Sometimes, however, the paroxysms are of such severity as to excite the belief that they are of malarious origin, and being treated with quinine they and the other symptoms attendant on the disease are greatly aggravated.

During the most intense period of the disease there are occasionally paroxysms characterized by entire inability to move a muscle of the body, the consciousness, respiration, and circulation not being materially disturbed. I have never had a case which exhibited these symptoms, though Krishaber appears to regard

them as not uncommon. On the other hand, syncope with complete loss of consciousness, which he speaks of as rare, is, according to my experience, by no means uncommon. With both of these conditions there is an almost continuous præcordial pain, sometimes severe enough to excite the idea of the existence of angina pectoris, and causing the gravest apprehensions on the part of the patient and his friends.

If the disease be not arrested it is quite certain to develop into one or another of the forms of cerebral congestion, apoplectic, epileptic, paralytic, soporific, maniacal or aphasic, to which in another place* I have given full consideration. I do not dwell upon them here for the reason that this essay is concerned only with a series of phenomena which I conceive to be due to cerebral hyperæmia, constituting the first or prodromatic stage of congestion of the brain.

* A Treatise on the Diseases of the Nervous System, 6th edition. New York: 1876, chap. i., Cerebral Congestion.

CHAPTER III.

DIFFERENTIAL DIAGNOSIS.

ALTHOUGH the symptoms of cerebral hyperæmia, such as I have described them, have been to some extent known, they have heretofore been ascribed to very different pathological conditions. Thus, they have been classed under the heads of *nervousness*, *dyspepsia*, *chlorosis*, *malarial disease*, and even under the very opposite condition to that to which I assign them—*cerebral anæmia*.

The name by which we designate a disease is of no great consequence so long as it does not lead us into erroneous ideas of treatment. But it is rarely the case that this can be avoided, and I am very sure injury has been done in the nomenclature of the affection under notice. It is important, therefore, to have exact conceptions of the character of the symptoms and the general course of the disease before we venture to give it a name.

Under the name of *nervosisme* or “*nervousness*,” Bouchut,* several years ago, described an affection

* De l'état nerveux aigue et chronique ou nervosisme, etc.
Paris : 1860.

which, so far as I can determine, does not essentially differ from that to which from the pathological condition I call cerebral hyperæmia. Among the symptoms are fever, general hyperæsthesia, headache, vertigo, hallucinations of sight and hearing, insomnia, palpitations of the heart, dyspepsia, paralysis, constipation, etc. Bouchut, however, almost entirely ignored the fact of the occurrence of these symptoms in men, and though recognizing the circumstance that they are often the result of emotional disturbance, is more disposed to attribute them to certain conditions of female life—pregnancy, disorders of menstruation, lactation, change of life, uterine affections, etc. Moreover, he made no observations with the ophthalmoscope or auroscope and no determinations of the temperature of the head, and hence fails altogether to identify the symptoms as being due to an increase in the amount of blood circulating within the cranium. Consequently the treatment recommended is not such as appears to be proper.

Many of the so-called *menstrual neuroses* are, in reality, cases of cerebral hyperæmia, the result of inordinate emotional strain. To establish this point it is only necessary to consult the collection of cases made by Berthier.* Thus, for instance, case 34 under

* Des névroses menstruelles ; ou la menstruation dans ses rapports avec les maladies nerveuses et mentales. Paris : 1874.

the head of hyperæsthesia, is clearly an almost typical case of cerebral hyperæmia, and is as follows (p. 49) :

“ Jeanne Thillois, aged 51 years, was of strong constitution and had never been ill, till at about her thirty-sixth year a violent mental emotion caused a suppression of the menses, and this was followed by heaviness of the head, wandering rheumatic pains, then by numbness in the arms, legs, shoulders, and scalp and by attacks of vertigo of so intense a character as to cause her to fall to the ground. A year later there were headache, delirium, weakness of the limbs, and pain along the whole length of the spinal column. She was treated with the cautery, and with blisters to the skin. With time there was a gradual amelioration of the pains, but the weakness of the limbs, troubles of speech and difficulty of deglutition persisted.”

Many other cases similar to the foregoing might be readily collected from Berthier, and nothing is more common than for just such mistakes to be made in regard to cause and effect, as in the instance cited.

The affection known as *chlorosis*, occasionally presents features similar in some respects to those of cerebral hyperæmia, and indeed there is reason to believe that the former is not only a disease of the nervous system, as I pointed out several years ago,* but

* Chlorosis, a Disease of the Nervous System. *Quarterly Journal of Psychological Medicine.* July, 1868, p. 417.

is in no essential respect different from the latter. A case occurring in my own experience and reported in the essay referred to, is so apposite in the present connection that I quote it in full :

“ A. G., a young lady aged 18, and in good health, was frightened by a runaway horse which, dashing furiously down the road along which she was walking, scarcely allowed her time to spring aside and escape injury. She managed to get home, notwithstanding the great mental and physical prostration which immediately succeeded her terror, and after drinking a glass of wine, to all appearance recovered her usual good health and equanimity of mind.

“ Previous to her fright she had never been what is called “ nervous.” Menstruation had begun at fourteen and had always been regular in every respect. Her appetite also had constantly been excellent, and she was strong and well developed for her age. Her complexion was ruddy, her pulse full and strong, her mind of good quality and of sound and healthy tone, her temper cheerful and equable and her character remarkable for its strength and for the conscientious devotion to duty, which was apparent in all her acts.

“ But soon after the occurrence of the event referred to, her friends noticed the beginning of a gradual change in these respects, but especially in her susceptibility to nervous impressions. From having

been cheerful and buoyant in mind she became melancholy and depressed ; and instead of being open-hearted and free from deceit, she began to show evidences of hypocrisy and even of want of truthfulness. At the same time her temper grew irritable and peevish. The slightest sudden noise caused her to start ; a bright light disturbed her ; the least touch was magnified into a severe blow ; she constantly smelt bad odors and complained that nothing tasted as it did formerly. Her appetite became irregular and capricious. Things which she once liked she could not now eat at all, and others which she had never fancied became the chief articles of her diet. Sometimes she ate voraciously, while at others she would go for several days scarcely eating enough to sustain life. Severe dyspepsia, attended with pain, heartburn and eructations set in. The bowels were generally constipated, the liver was inactive, the heart palpitated violently on the least exertion, the skin was dry and harsh, her hair began to fall out, her spine became tender in the cervical and dorsal regions, and her complexion assumed the greenish color so characteristic of chlorosis.

“ All these changes were effected within a month after the occurrence of the shock to her nervous system already mentioned. During this period I repeatedly examined the blood microscopically and always found the normal proportion of red corpuscles to be

present. The menstrual period came on during the third week. The flow was as good as usual, and was neither of diminished nor increased quantity.

" Finding no change in the blood and detecting no bellows murmur at the base of the heart or along the course of the great arteries, I did not suppose the affection to be chlorosis, for I had been taught to regard this disease as being due to anæmia and as always being associated with the signs and symptoms of that condition. From the history of the case and the prominent phenomena of its course, I was disposed at first to regard it as one of those hysterical affections so frequently met with in young women, and which in some respects it actually resembled. I therefore treated it for the first two or three weeks with antispasmodics and tonics, the latter consisting of quinine and iron, and recommended good, nourishing food and moderate physical exercise. Had the existing condition been one of anæmia, these measures would have been clearly indicated and would doubtless have proved beneficial. As it was, the patient showed no signs of amendment ; on the contrary, she grew gradually worse, and a month subsequent to the beginning of her disease was in a condition from which I was fearful it would be difficult to rescue her. I now abandoned the use of antispasmodics, of which I had tried a large number, and though I could, upon repeated examination, find no diminution of the red

corpuscles, I was certain the disease was chlorosis. I therefore continued to administer iron and quinine, and in addition prescribed a bottle of ale every day.

"About this time, being necessarily absent on one occasion when I was sent for to see her, another physician was called in for the emergency. He, conceiving the case to be one of congestion of the liver, bled her to the extent of eight ounces and gave her a powerful dose of some cathartic medicine, of which calomel formed the staple ingredient. I returned soon after he had taken his leave, and while the blood still stood in a basin on the table. Coagulation had taken place, and the fluid was altogether of perfectly normal characteristics. As to the patient, she was very materially weakened. I took the whole quantity of blood with me for the purpose of analyzing it. The following table exhibits the result, Scherer's method of analysis being employed. I omit that part of the table showing the composition of the serum, as having no direct bearing on the main points concerned:

" 1000 parts of blood	
Water.....	791.27
Solids.....	208.73
Fibrin.....	2.18
Blood corpuscles.....	131.11
Albumen.....	65.09
Extraction.....	3.98
Soluble salts.....	20.41

Total.....	212.77
Difference.....	4.04

" I had never made an analysis of the young lady's blood before the accession of her ill health, and therefore I am unable to present a comparison of the composition of this fluid in both conditions. It will, however, be seen that there is no abnormal deviation from the ordinary healthy standard, and that the quantity of red corpuscles is fully up to the average of full health.

" After the bleeding and severe purgation the patient was greatly reduced in strength, so much so as to make me anxious for her life. I had given iron and quinine faithfully, and had endeavored to maintain her strength by nourishing food and the employment of sound hygienic means ; all, however, had been without avail, and I found my preconceived ideas relative to the pathology of the disease under which she labored entirely confounded by the repeatedly ascertained facts, that there was no bellows murmur at the base of the heart or along the course of the great vessels, no diminution in the quantity of red corpuscles present in the blood, and no derangement of the menstrual functions. Under these circumstances I carefully re-studied the case, and although I could not avoid seeing that, while all the symptoms of the affection under which she labored were those of chlorosis, it was very evident that the signs indicating anæmia were absent. While, therefore, I continued the use of a strong nourishing diet and enjoined moderate

physical exercise and mental relaxation, I substituted arsenic and strychnia for the other medicines. I gave her ten drops of Fowler's solution and the thirtieth of a grain of strychnia, three times a day. I decided on this treatment for the reasons that the disease appeared to be one in which derangement of the nervous system formed the most prominent feature, and because I had previously, in other affections, satisfied myself of the efficacy of arsenic and strychnia in giving tone to the exhausted nervous centres and in relieving those functional derangements of the viscera due to disturbed nervous action.

" She had not taken these remedies longer than four or five days before a change was perceptible in her condition. She said she felt more like herself than at any time since her fright ; her eyes became brighter ; she began to take interest in events which were passing around her ; her appetite increased and was natural in its tendencies ; from having been exceedingly wakeful at night, she now slept well ; the tenderness along the spine disappeared ; she was no longer startled at slight sudden noises ; she became able to concentrate her mind upon subjects ; and her abnormalities of character and disposition became less and less strongly shown. Gradually all these changes and others necessary to her restoration to health went on, and after taking the arsenic and strychnia for about six weeks her recovery was complete, so far as

I could see, in every respect. About a year subsequently she married. She has now five healthy children and is herself the type; mentally, morally and physically of what American women ought to be."

And it gives me pleasure to add, that she is now, twenty years after her restoration to health and the mother of eleven children, more able to endure mental or physical strain than nine-tenths of the women of half her age.

Dr. Handfield Jones* has, under the name of "Hyperæmia of the Brain," described a condition bearing but slight resemblance to that under consideration, but rather in its main features assimilating with congestion; but the disorder which he designates "Cerebral Excitement" is so very much like what I would term cerebral hyperæmia, that I am quite sure we refer to the same pathological entity. Indeed, he expresses the opinion that the arterial vessels of the brain are in a state of repletion, but he regards this state as secondary to another which he believes to be an "excitation of the tissue."

The cases cited by Dr. Handfield Jones all present more or less affinity with cerebral hyperæmia, as I have described it in the present essay. I quote one which was under his own care:

"H. T., aged 52, admitted November 25th, 1866.

* Studies on Functional Nervous Disorders. London: 1870.

A very strong-made, large, hardy-looking man, who has achieved well-deserved repute by his able and successful management of a well-known life-boat. I saw him first October 29th, when I made the following notes :—About six years ago he got a fright while he was out with the life-boat, from a man being washed overboard. He felt his inside run round and he became giddy, but did not lose consciousness, and went on with his work. He never got quite right after that night : his head has been affected ever since. Before this happened, on one occasion he was pitched out of the life-boat into a vessel and hurt his shoulder. His left knee has been injured also in the same way, but he does not seem to have hurt his head at any time. At present he is quite unnerved, gets no sleep at night, being troubled with dreaming and fancies. In fact, has a degree of delirium—does not know what he is about. Has much sweating at night, and is either “all on a work,” as his wife describes it, with his arms or legs, or else he is busy electioneering or cutting arms and legs off, or singing, etc. The tip of his tongue gets very sore, too, at night. Every morning for years since he has been ailing, he has vomiting and purging when he gets up in the morning; it does not occur during the day if he keeps quiet. Is so irritable, if he worries himself at all he gets all in a tremble. Is often obliged to come home and go to bed two or three times a day. His limbs are full of aches and pains in

blowy weather. His memory fails very much; no paralysis; pupils normal; no strabismus. Head not unduly warm [probably Lombard's instrument would have told a different story]; is not anæmic. Manner quiet. Has always been temperate. Appetite bad; tongue natural. Is worse than he was a year ago. At the time of his admission he was rather better than he was a month before, since he had kept quite still and done no work. An intelligent observer who took great interest in his case described him as a wreck. His urine was of sp. gr. 1020, of full red color, not albuminous. He was ordered strychnia, gr. $\frac{1}{20}$ + acid nitric Mij. + tr. valerian, 3 i. + infus. valerian, 3 i. *ter die* morph. muriat. gr. $\frac{1}{3}$ + ext. hyosciami, gr. iv. *on*, and for diet ordinary cocoa, ale Oj., brandy 3 iv. During the earlier part of this stage in the hospital he complained of trembling, numbness, and tingling of arms and legs, coming on intermittently, of bad headache followed by black spots before his eyes, itching of head and back of neck, and forgetfulness. The dose of strychnia was raised to gr. $\frac{1}{20}$ [?] and the valerian was replaced by quin. disulph. gr. iiij., and this again by gr. viij. of citrate of iron and quinine. By January 30th he had recovered so far that he had lost almost all trace of nervous disorder and returned home well and hearty, though by no means capable of resuming his former arduous exertions."

I should certainly call this a case of cerebral hy-

*exhaust
nd of anaemia
well as of
peræmia*

peræmia, as I understand it. It is of course marked by "cerebral excitement;" but then this latter is only a symptom, while the former is a disease.

It is often the case that cerebral hyperæmia is confounded with another entirely different affection—cerebral anæmia, or a deficient circulation of blood within the cranium. As the two affections are the very opposite of each other, and as a mistake in the diagnosis would lead to serious errors in treatment, it is proper to consider the differential points at some length.

The condition often induced by some powerful emotion, and known as *shock*, presents some features of resemblance to cerebral hyperæmia. Thus, there may be loss of consciousness, irregular action of the heart, and pain in the head. But the pallor of the face, the dilatation of the pupils, the coldness of the skin and the feeble respiration and pulse, are sufficient for the ready recognition of the real character of the state in question, and the subsequent clinical history only serves to make the diagnosis more decided.

In a somewhat less severe form of cerebral anæmia there may be illusions and hallucinations, and some confusion of ideas. A low form of delirium may also be present. But there is again, the dilated pupil, the feeble heart, the pallid face, the cold skin, so characteristic of a deficient blood supply to the brain.

And in chronic cerebral anaemia, no matter what may be the other symptoms—and frequently they present great resemblances to those of cerebral hyperæmia,—the distinction can be clearly drawn by attention being given to the foregoing points.

When, however, we come, in addition, in all forms in which anaemia of the brain may present itself, to bring to our aid the calorimeter of Lombard—or in its absence sufficiently delicate thermometers applied to the scalp—the ophthalmoscope, and the aural speculum, errors in diagnosis can scarcely occur.

And to supplement all this, we have to recollect that in cerebral anaemia, vertigo is scarcely ever a prominent feature, and that so far from being wakeful, the patient is, on the contrary, almost constantly drowsy. No diagnostic mark is of so great importance as this latter, and I regard it as of itself sufficient to determine the question. Sleep is the result of a diminished amount of blood in the cerebral vessels, and when this diminution does not pass a certain normal limit, natural sleep results. If, however, the brain is to an inordinate extent deprived of its circulating pabulum, drowsiness is the consequence. Wakefulness, on the contrary, is produced by an excessive amount of arterial blood in the brain, and hence it becomes a prominent feature of cerebral hyperæmia. It is true that in the advanced stage when, instead of

hyperæmia there is rather congestion, stupor may ensue, but stupor is by no means sleep.*

Cerebral hyperæmia may be confounded with softening of the brain, and it is not unfrequently the case that patients come to me to be treated for the latter disease, when they are in fact suffering from the former. I generally tell such that when they get to be affected with cerebral softening they will not of their own accords consult a physician, but will be brought to him by their friends. In fact, the two conditions have scarcely any but the most superficial resemblance. In softening, the intellect is seriously and permanently impaired, and the morbid process advances sometimes slowly, almost always certainly, to a fatal termination. In those cases due to embolism there are often loss of consciousness and persistent hemiplegia coming on suddenly and followed by death in a few days ; or there is an equally sudden aphasia, accompanied by loss of the power of motion, generally on the right side, and unattended by any derangement of the mental faculties, beyond, perhaps, emotional weakness ; or there is delirium without

* For a fuller description of cerebral anæmia the reader is referred to the sixth edition of the author's Treatise on Diseases of the Nervous System, and for a still more complete account, to Dr. J. Milner Fothergill's essay on Cerebral Anæmia, in the West Riding Lunatic Asylum Medical Reports, vol. iv., 1874, p. 94.

paralysis or convulsions, but with a great degree of mental and physical prostration. In these cases, careful inquiry will generally reveal the pre-existence of articular rheumatism or the presence of organic disease of the heart.

Some of the head symptoms of Bright's disease are similar to those of cerebral hyperæmia, but attention to the clinical history of the case will prevent any mistake in the diagnosis of the affections. Thus, the existence of kidney-disease, as revealed by a chemical and microscopical examination of the urine, the ana-sarca of the face or limbs, and the repeated attacks of convulsions and coma, will be sufficient to determine the presence of the former affection and not the latter.

In the vertigo which occasionally results from gastric derangement, the fact that it is only present while the stomach is digesting its contents, and that other symptoms of dyspepsia are evident and unaccompanied by the mental and physical disturbances characteristic of cerebral hyperæmia, will prevent in the majority of cases any errors of diagnosis being committed. When to these we add the results obtained by ophthalmoscopical and calorimetrical examination, the liability to mistakes is greatly lessened.

In auditory vertigo or Méniere's disease, as it is sometimes called, there are auditory troubles. The

face is pale, and there is almost invariably vomiting, or at least intense nausea.

Indeed there are few diseases so distinctly marked by their symptoms and clinical history, as that which forms the subject of this essay.

CHAPTER IV.

CAUSES.

IN the introductory chapter I have considered, to some extent, the most prolific causes of cerebral hyperæmia—those of a mental or emotional character—and of this category the emotional are by far the more frequent. A sudden shock of this description may, as we have seen, induce the affection instantaneously ; but still more common are those instances in which some powerful emotion, acting day by day, and even night by night, slowly, perhaps, but with terrible certainty, leads to the more or less permanent increase of the intra-cranial arterial blood with all the inseparable phenomena.

But, though unduly severe or prolonged intellectual effort is exceedingly liable to cause the disorder under consideration, I by no means wish to be understood as intimating that regular and full mental labor is at all a common factor in the production of cerebral hyperæmia. The brain of man is constructed for just that kind of work, and so far from the organ being injured thereby, it is developed and strengthened as certainly

as are the muscles by physical exercise. Eight or even ten hours of the twenty-four may, in the average individual, safely and advantageously be occupied with brain-work of as intense a character as may be necessary. But occasionally we meet with persons who are no more capable of such exertion than others are of running a half mile in two minutes, and who cannot be brought to the ability by any amount of training. For them to persevere in a contest for great mental superiority, or for accomplishing a task beyond their powers, is destruction of their cerebral organization. The walls of their intra-cranial vessels are weak, and hence when once they have become distended, they do not readily return to their normal size.

The same effect is produced by inordinate mental exercise in those to whom eight or ten hours labor of the kind in question is no more than they can healthfully perform. Deprivation of amusement, insufficient physical exercise, by which the blood is not sufficiently diverted from the brain, and above all, using their brains during the hours that should be given to sleep, will speedily result in cerebral hyperæmia, and probably, even, in some more serious disease. The individual who shortens his normal period for sleep, in order that he may increase his hours of intellectual labor is, by depriving his brain of the necessary amount of repose, in the position of one who is "burning his candle at both ends." He is literally consum-

ing his brain-tissue faster than he makes it, and perseverance in that course will certainly lead to brain-bankruptcy. Few organs in the body can endure as much hard usage as the brain ; but there is a limit to its power of resistance and recuperation, in every one, which cannot be passed with impunity.

Cases of cerebral hyperæmia from excessive intellectual exertion are frequently met with in the young, whose mental powers are overtaxed before their brains are sufficiently developed. A growing brain needs to husband its powers for the normal formative processes of the cerebral organization. The blood which circulates in its substance is charged with no more pabulum than is sufficient for this growth, and for such mental labor as will aid in strengthening the various faculties of the mind, and if it be consumed in the production of force beyond these requirements, disease is the necessary consequence. Cases of the kind in young men and women who are striving to cram their minds with numerous studies are of almost daily observation. Certainly, my experience goes to establish the fact that the study of mathematics is bad for the average young woman's mind. I have repeatedly had instances of cerebral hyperæmia under my charge occurring in young ladies of from fifteen to seventeen years of age, in whom it was directly induced by the study of calculus, spherical trigonometry, and civil engineering. I have now the care of a young lady, six-

teen years of age, in whom the disease came on rapidly, in consequence of long-continued and close application to the solution of a mathematical problem. But so long as there are ambitious women who want their sex to study all the subjects men do, I suppose civil engineering will be responsible for many hyperæmic brains in young girls.

Dr. Richardson * says in regard to the subject of mental work for the young :

"The extent to which over-mental strain is injurious to the young varies according to the kind and character of work. The endeavors to fill the minds of children with artificial information leads to one of two results. Not unfrequently in the very young it gives rise to *direct* disease of the brain itself, to deposit of tubercles if there be predisposition to that disease, to convulsive attacks or even to epilepsy. In less extreme cases it causes simple weakness and exhaustion of the mental organs with irregularity of power. The child may grow up with a memory taxed with technicals and impressed so forcibly that it is hard to make way for other knowledge ; and added to these mischiefs there may be and often is the further evil that the brain, owing to the labor put on it, becomes too fully and easily developed, too firm and too soon mature, so that it remains throughout manhood

* Discourses on Practical Physic. London : 1871, p. 15.

always a large child's brain, very wonderful in a child, and equally ridiculous in a man or woman. The development in an excessive degree of one particular faculty is also a common cause of feebleness."

From another work * I quote the following opposite case : " A youth of fifteen was brought to me by his father, on the 16th of August, to be treated for obstinate wakefulness, the consequence of severe mental exertion at school several weeks previously. He had not attended school since the last of June, but had scarcely slept more than an hour or two each night since that time, according to his own and his father's statement. He was a healthy, well-grown lad, with a good appetite, and nothing unusual in his appearance beyond a slight look of weariness and anxiety in his face. During the day there were no hallucinations of any kind, and towards evening he invariably felt overpowered with sleep. As soon, however, as he lay down, he heard voices repeating extracts from the lessons he had recently been reading, and his mind became occupied with imaginary scenes in which the gods and goddesses of mythology, and the heroes and poets of antiquity, played prominent parts, and the whole power of his attention was thus kept engaged with these and other scenes, which were formed with astonishing rapidity. Towards morning

* *Sleep and its Derangements.* Philadelphia: 1869, p. 256.

he fell into an uneasy slumber, and awoke feeling more weary even than when he had gone to bed.

" Medicines, among which opium was the chief, had been employed without success. On the contrary, his condition was manifestly rendered worse through their influence. Laudanum, of which he had taken large quantities, always caused headache without producing the least amelioration in his symptoms. Notwithstanding the palpable connection which existed between the wakefulness and his former intense mental application, he had been allowed to continue his studies, and when he came to me had a Latin grammar in his hand which he had been diligently studying in a street railway car.

" After some plain conversation with the father relative to the great danger to which he was subjecting his son, by thus inordinately taxing his mind, I directed the entire cessation of all studies for the present, and a complete change of associations, by a visit to the sea-shore and free indulgence in bathing, fishing, and other recreations. I likewise advised the use for a few nights of small doses of the bromide of potassium. My advice was implicitly followed, and a few days since I received a visit from the boy's father, and was told by him that his son's health had been completely restored. I recommended that the visit to the sea-side should be prolonged a week or two, that the return to study should be gradual, and that

the boy's eagerness to learn should be somewhat restrained by occupations and amusements requiring but little mental occupation."

There are certain occupations which, owing to the harassing emotions to which they give rise, are directly productive of a tendency to cerebral hyperæmia, and in many cases to the disease itself. And here I am again tempted to quote from Dr. Richardson's suggestive address "*On Physical Disease from Mental Strain*," merely premising that his remarks are equally applicable to the affection now under notice.

"First, there is the mere copyist, the man who sits all day at his desk and transfers copies of writing or of a speech to a piece of paper. The clerk, the compositor, the reporter, and the second and third rate author are of this class.

"Secondly, there is the thinker and writer who copies also, but not directly from other writings nor from thoughts expressed by other minds, but who goes to the great manuscripts of the Supreme Author —to the hills and plains and oceans, to the living kingdoms of all animals and of all times, and translates the histories of them in written words, bringing the vastness of the Universe, as seen by his superior sense, into moderate compass and legible form so that lesser minds may read through him the truths he sees and unfolds.

"Thirdly, there is the speculative man, usually very selfish and locked up in himself ; who, from day to day, and night to night, and hour to hour, schemes ; who walks with his head down, his eyes on the earth, and thinks; thinks how he shall meet this obstacle, waylay that plan, shrewdly anticipate such and such events ; a truly business man in the world's common acceptation.

"Fourthly, there is the man who carries on his shoulders other people's anxieties, who thinks for others rather than for himself, and must never be tired of the effort; the professional man is here represented, the politician, the minister of religion, the physician and surgeon, and the accountant.

"Fifthly, there is the artist who labors towards perfection in producing some given form, ideal or real, who, absorbed in his work, forgets the noisy crowd around him, and day after day toils on, living with his own creations, one in the world but not of the world.

"Lastly, there is the student ; the child or youth whose will is hardly his own, who works when he is bidden, and plays when he is permitted, who is fed too often with flattery or blows, and between or by one and the other, is at length turned out in life prepared, as it is thought, by education and training, to fight the great and unceasing battle of life."

And it may be added as specially applicable to

this country that here all these avocations are pursued with an intensity unknown in the old world, and that as the nervous system of the average American is far more impressionable than that of the average European, the abnormal effects are more certain and far more decided. The man who goes down to Wall street day after day, after a sleepless night, not knowing exactly where he is to get the money to meet his obligations by three o'clock, or even that he will get it at all, is the prey of just that kind of emotional disturbance—anxiety—which is most powerful in producing cerebral hyperæmia, and this condition, sooner or later, is almost certain to be the result.

There is an occupation followed quite extensively in this country, though almost unknown as a distinct business in Europe, and that is, inventing machines and devices of various kinds, for which patents are obtained. The inventor who is assiduous in the practice of his profession, is probably more subject to mental strain than the followers of any other occupation. His mind is constantly engaged in making new combinations, in seeking to counteract obstacles, and in endeavoring, often, to come as near as possible to some one else's machine without infringing the patent right. All this requires very intense mental exertion and strain, and at the same time various conflicting emotions are brought into operation to increase the cerebral disturbance. It is not, therefore, a sub-

ject for surprise that such people break down, are affected with wakefulness, pain in the head, mental confusion, and the other symptoms indicative of the existence of cerebral hyperæmia. Sometimes, the mind becomes manifestly weakened, and sharp, shrewd men overlook some important point, to the detriment or entire ruin of their schemes for acquiring wealth.

Thus, a man came to me not long since complaining of most of the symptoms I have mentioned in the present connection, and who, for several years, had been intensely engaged in the invention of an apparatus for rolling bandages. The instrument was exceedingly complicated and expensive, but was capable of rolling several thousand bandages a day. It was certainly very beautiful, but his time and money had been entirely thrown away, for there was not the least demand for anything of the kind. I do not suppose he ever sold a single one.

Individuals who are not accustomed to the use of their minds in a regular and thorough manner, or who are so circumstanced as not to be hardened, to some extent, to the effects of emotional disturbance, break down under strains that would be nothing in others, who, living in large cities and mixing with the world, become in a manner used to hard mental work and temporary excitement or depression, as the case may be. These things are relative. The farmer, for instance, gets a hyperæmic brain from calculating how

much he is going to receive from his few tons of hay and bushels of corn, while the bank clerk or the Wall street operator will add up hundreds of columns of figures, and determine the results of all kinds of abstruse financial problems without the least brain derangement. Again, a person whose whole life has been passed amid tranquillity, succumbs to an emotion that the care-hardened man of the world resists with ease. Some of the worst cases of cerebral hyperæmia I have ever seen, have occurred in country people as the results of mental exertion or emotional disturbance, which the city-bred individual would regard with entire indifference.

But it is not to be forgotten, that the mass of cases of cerebral hyperæmia rests largely with those individuals, who are apparently inured, by repeated experiences, to all kinds of mental strain and emotional excitement. With them as with grosser forms of matter excessive use causes excessive decay—

“Gutta cavat lapidem, consumitur annulus usu,
Et teritur pressa vomer adhunc humo.”

There are other causes of cerebral hyperæmia besides those to which attention has been drawn. Thus, very hot weather may induce it by the general irritation of mind to which it gives rise. Cold weather may cause it by its constringing influence on the cutaneous vessels, and the consequent accumulation of blood in the brain as well as in other internal organs.

The direct rays of the sun falling upon the exposed scalp give rise to many cases of cerebral hyperæmia, especially in large cities ; and artisans whose occupations require them to expose their heads to direct artificial heat often suffer in like manner. I have known two cases in which it was apparently caused by the use of hot shower-baths, in which the water was allowed to fall from a height on the naked scalp.

There are many substances which, when taken into the stomach or inhaled into the lungs, increase the amount of intra-cranial arterial blood. Among these are the various alcoholic liquors, camphor, opium in small doses, belladonna, Indian hemp, quinine, sulphuric ether, chloroform, the nitrite of amyl, etc. A like power is also exerted by tea and coffee, and probably in some cases by tobacco.

Of the causes inherent in the individual, sex and hereditary influence are especially to be noticed. The disease is certainly more common in males than in females, and there appears in many cases to be a decided tendency to hereditary transmission.

Venereal excess is an efficient cause in both sexes, but especially in males. It is difficult in general to arrive at the truth in regard to this point, but the results of my experience are such as to establish the fact of its influence beyond a doubt.

CHAPTER V.

PROGNOSIS.

THE probability of recovery in cases of cerebral hyperæmia depends on the submission of the patient to proper treatment, medical and hygienic, and the removal of the cause. If these means can be carried out, a favorable result can almost always be anticipated. A spontaneous recovery is, however, a rare circumstance, and it becomes impossible if the patient continues to do those very things which have caused the disease. The tendency of the affection is, if it be not arrested, to pass into one or the other of the fully developed forms of cerebral congestion already mentioned, and then the liability to secondary lesions, such as softening, cerebritis, cerebral haemorrhage, aneurisms, general paralysis, etc., must be taken into account.

The apoplectic form of cerebral congestion is that to which there appears to be the greatest predisposition, and the epileptic and paralytic come next in order. The soporific, the maniacal and aphasic, are more rare, but are occasionally met with.

I have never known a patient to die of uncom-

plicated cerebral hyperæmia. But instances of a fatal result from some one or more of the ulterior conditions into which it tends to develop, are not very uncommon.

CHAPTER VI.

MORBID ANATOMY AND PATHOLOGY.

THE morbid anatomy and pathology of the disease exhibiting the phenomena to which the foregoing remarks have been applied, must remain to some extent a subject for speculation till *post-mortem* examinations enlighten us as to its real nature. Nevertheless I am quite sure, for the reasons already stated and others presently to be adduced, that the affection consists primarily of an increase in the quantity of blood circulating in the cerebral arterial vessels ; or of what I have designated cerebral hyperæmia.

Briefly these are as follows :

1. The redness of the face, and throbbing of the cephalic arteries, indicate an increased determination of blood towards the head.
2. The sensation of fulness of the head almost invariably present.
3. The increased heat of the head, not only subjectively, but as indicated by the thermometer or the thermo-electric calorimeter.
4. The persistent insomnia always present—a condition now known to be due to cerebral hyperæmia.

5. The aggravation of all the symptoms by intellectual exertion or emotional disturbance.

6. The results of ophthalmoscopic and aural examination.

7. The effect of the sulphate of quinine, strychnia, nitrite of amyl, alcoholic liquors, and other agents which we know increase the amount of blood in the brain, in aggravating the symptoms of the disease.

8. The speedy disappearance of the phenomena under the influence of mental quietude, and of those therapeutical agents which lessen the amount of the intra-cranial blood.

But it is still the habit of some individuals in the medical profession to declare that the quantity of the intra-cranial blood is unalterable. I may, therefore, perhaps, be excused for quoting from another work* the following remarks on this subject :—

“ In the cases of infants, in whom the anterior frontanelle is still open, the scalp is seen to be elevated above the level of the skull, when the head is dependent, and depressed when the head is elevated.

“ The same fact is observed in persons who have suffered injury of the skull involving the loss of a portion of its substance. During strong emotional excitement, or the action of any cause capable of increasing the force of the circulation, the scalp is

* A Treatise on the Diseases of the Nervous System. New York. 1876, p. 49.

elevated ; from the action of opposite causes, it is depressed. Both in infants and in persons who have received injuries such as those cited, the scalp is seen to be depressed during sleep, and to rise as soon as the individual awakes.

" A dependent position of the head causes a sensation of fulness or even pain ; and blood may pour from the nostrils. The eyes are observed to be blood-shot, and the countenance indicates congestion. A tumor, a ligature, or any other cause capable of exciting pressure on the jugular veins, will produce like effects. Ophthalmoscopic examination under such circumstances shows the veins of the retina to be enlarged, indicating that an obstruction exists to the return of blood through the sinuses and veins within the cranium. Post-mortem examination of persons dying who, during life, have suffered interruption to the perfect return of blood from the head, reveals the existence of intra-cranial congestion. Animals subjected to experiments calculated to act in the manner stated, are after death found to have congested brains.

" In animals bled to death, the brain is found anæmic in an extreme degree.

" Direct experiment still more positively establishes the fact under consideration. If a portion of the skull of an animal be removed, and the aperture be then securely closed with a watch-glass, the vessels will be seen to enlarge and contract, according

to the cause brought into action, and the brain will be correspondingly elevated or depressed.

“By means of an instrument devised, independently of each other, by Dr. S. Weir Mitchell and myself, the degree of pressure within the cranium can be accurately measured. It is thus seen that the quantity of blood circulating in the brain undergoes material variation.*

“The anatomical arrangement of the blood-vessels of the cerebral tissue, is such as to admit of an enlargement of their calibre, without necessarily subjecting the perivascular substance to pressure. Robin † discovered the existence of sheaths around these vessels, and his observations were subsequently confirmed by His, ‡ who ascertained that the same arrangement exists in the spinal cord. According to His, ‘Fine transverse sections of a hardened brain, having its vessels injected or otherwise, show that all the blood-vessels, arteries, veins, and even capillaries, are sur-

* “For a more complete argument on the subject, and for a statement in detail of the experiments of Mr. Durham and myself, the reader is referred to the author’s monograph, *Sleep and its Derangements*, Philadelphia: J. B. Lippincott & Co., 1870. The cephalo hæmometer here referred to in the text is described in that work (Appendix), and also in the Introduction to this treatise.”

† *Journal de la Physiologie de l’homme et des Animaux*: 1859, p. 527.

‡ *Zeitschrift für Wissenschaftliche Zoologie*: 1865, B. & V.

rounded by a clear space, prominent in the case of the largest vessels, but in all cases quite sharply defined externally. In transverse sections the vessels are seen to be surrounded by ring-like spaces ; and in parallel sections the space is seen on each side of the trunk of the vessel, and follows its ramifications.

“ These perivascular canals are lined by a hyaline membrane, and are capable of being injected, and in case of chronic congestion may become permanently enlarged, so as to cause the appearance referred to under the heading of “ Morbid Anatomy.”

Admitting that there is such a condition as cerebral hyperæmia, the next question to be considered is—Does the fact of the amount of arterial blood in the brain being increased, account for the symptoms observed in the disease under notice ? In other words, what are the effects of cerebral hyperæmia ? These questions have already been considered to some extent, but a few more remarks on the subject will probably not be considered out of place.

Every action of the brain, whether it be a perception, an emotion, an intellecction, or a volition, is the immediate result of an increase in the amount of the intra-cranial blood. With each manifestation of mental force in any one of the ways mentioned, there is a necessary decomposition of a certain quantity of cerebral tissue. Within certain limits, these are healthy processes. The brain is so constituted, that

it can become hyperæmic ; and it is a normal act for its tissue to be consumed, in order that brain-force—mind,—may be evolved. A slight exaggeration in the ordinary, habitual, every-day flow of blood to the brain, leads to acuteness of perception, brilliancy of thought, excitement of the emotions, and strength of the will.

Some persons are dull in all their intellectual processes till they become excited,—warmed up to their work as it were—that is, till the circulation in their brains is rendered more active, and then their thoughts come thick and fast, and are of good quality. Others can never compose prose, poetry, or music, till they have excited the action of the heart, and, as a consequence, increased the amount of arterial blood in the brain, by stimulating ingesta, such as opium, alcoholic liquors, tea or coffee ; others require to make use of physical means to augment the vividness of their perceptions, their thoughts or emotions. It is said that the tints of the landscape are brighter if we reverse the position of the head. A “tumbler” in a circus told me not long since that everything around him appeared more brilliant, and that his thoughts were certainly more intense when he stood on his head.

Tissot * cites an instance in which position was taken advantage of to solve a problem in mathematics.

* *Avis aux gens de lettres et aux personnes sédentaires sur leur santé.* Paris : 1765.

A gentleman, remarkable for his accuracy in calculation, for a wager, *lay down in bed*, and wrought by mere strength of memory a question in geometrical progression while another person in another apartment performed the same operation with pen and ink. When both had finished, the one who had worked mentally, repeated his product, which amounted to sixteen figures, and insisting that the other gentleman was wrong, desired him to read over his different products. On this being done he pointed out the place where the first mistake lay, and which had run through the whole. He paid very dearly, however, for gaining his wager, as for a considerable time he had a swimming in his head, pains in his eyes, and severe headaches upon attempting any mathematical labor.

The engineer Brindley used to retire to bed for an hour or two when he was reflecting on a great or scientific project.

A gentleman informs me that so assured is he of the greater activity of his mind when he lies down, that he has had constructed a special apparatus by which he is enabled to write while in the recumbent position.

Cases such as these are on the border-line of disease, and sooner or later pass over to the other side. The same may be said of most instances in which recourse is had to stimulating ingesta to render the brain more active.

The principal subjective symptoms of cerebral hyperæmia, when it is of such a degree of intensity as to constitute disease, are wakefulness, pain increased by mental exertion ; and mental aberration of some kind or other. Of these the first is the most important, not only on account of the suffering and injury it is to the patient, but because it is the necessary accompaniment, the pathognomic symptom of the affection in question. Without wakefulness there is no cerebral hyperæmia, with cerebral hyperæmia there is always wakefulness. To establish the connection between the phenomena and the pathological condition is a matter of great moment, and that point I propose therefore to consider at some length.

It has been definitely established by the experiments of Mr. Durham and myself that during sleep the quantity of the intra-cranial blood is lessened. Durham made circular perforations in the skulls of animals so as to expose the brain, and then covering the openings with watch-glasses hermetically sealed around the edges, observed the state of the circulation below. Whenever the animal went to sleep the surface of the brain became pale, and the whole organ was reduced in size, as shown by the fact that it no longer rose into the hole in the skull. As soon as the animal awoke the vessels became full, and the brain enlarging in consequence, protruded through the perforation in the cranium. My own experiments, per-

formed independently of Mr. Durham's, though a short time afterward, were to the same effect, and by means of an instrument to which reference has already been made, the amount of expansion with wakefulness and collapse with sleep were very accurately measured. Since then, additional experiments, with like results, have been performed.

But we are not obliged to rely on experimental evidence, at least not on such testimony of our own devising. Thus, it is stated by Blumenbach * that a young man, eighteen years of age, fell from an eminence and fractured the frontal bone on the right side of the coronal suture. After recovery took place, a hiatus remained covered only by the integument. While the young man was asleep, this chasm was quite superficial, but as soon as sleep ensued, it became very deep. The change was due to the fact, that during sleep the brain was in a collapsed condition owing to the diminished quantity of blood, while as soon as wakefulness began, the brain, being possessed of an increased amount of blood, was larger.

Dendy † states that there was in 1821, at Montpellier, in France, a woman who had lost part of her skull, and the brain and its membranes lay bare; when she was in deep sleep the brain remained motionless

* Elements of Physiology, translated by John Elliotson, M.D., etc., 4th edition, London: 1828, p. 191.

† Philosophy of Mystery, London: 1841, p. 283.

beneath the crest of the cranial bones ; when she was dreaming it became somewhat elevated ; and when she was awake it was protruded through the fissure of the skull.

In 1854, a man came under my observation who had, through a frightful railway accident, lost about eighteen square inches of his skull. There was thus a fissure of his cranium three inches wide and six inches long, the brain being only covered by its membranes and the scalp. The lost portion consisted of a great part of the left parietal, and part of the frontal occipital and right parietal bones. The man, who was employed as a wood-chopper, was subject to severe and frequent epileptic fits. In the course of my treatment of him I soon became acquainted with the fact, that at the beginning of the comatose condition which succeeded the fits, and during which, the brain was gorged with blood, there was invariably an elevation of that portion of the scalp covering the deficiency of the cranium. As the stupor passed away and natural sleep ensued, the scalp gradually became depressed. When the man was awake, the region of scalp in question was almost always on a level with the upper surface of the cranial bones. I also noticed on several occasions, that during natural sleep, the fissure was deeper, and that on the instant of awaking, the scalp covering it rose to a much higher level.

Recently, I had occasion in the performance of an

operation on the cranium of a boy about twelve years of age, to remove, with the trephine, saw and pliers, about six square inches of the skull, the centre of the removed part consisting of the posterior superior angles of both parietal bones, and the posterior angle of the occipital bone. Owing to the fact, that the dura-mater remained intact, the surface of the brain was not visible, but as the edges of the scalp were not brought together for several hours on account of a little oozing of blood which existed, I had the opportunity of observing that when the boy slept, the brain sank away from the fissure, while as soon as he awoke it arose far up into the hole, so that at the centre it was higher than the outer surface of the skull. As the superior longitudinal sinus occupied this situation, I was enabled to perceive, that there was no apparent increase in its size during wakefulness, and that therefore the augmentation in the size of the brain was due to an increased afflux of arterial blood.

If the scalp covering the anterior frontanelle of very young infants be observed while they are asleep, it will be noticed that it is depressed, and that when they are awake it is elevated.

Again, we have in the action of certain hypnotics very instructive experiences relative to the state of the brain as regards blood supply. All those which produce sleep probably do so by their action in lessening the amount of the intra-cranial arterial blood. On

the other, hand those substances which increase the supply are directly provocative of wakefulness.

From all of which it would appear to be a fact as well established as any other in pathology, that cerebral hyperæmia is the immediate cause of the symptoms mentioned in the course of this monograph.

And yet in his very excellent treatise, to which reference has already been made, Krishaber enunciates the opinion decidedly, that it is to anæmia of the brain, that the symptoms of the affection are to be ascribed. According to him, cerebral anæmia is the immediate cause of the cerebral excitement. It must be admitted, however, that if a diminution in the amount of blood in the brain causes mental exaltation and an increase in the intensity of the other cerebral functions, then is the brain subject to a different law than that which governs the other organs of the body, and some of the best established points in cerebral physiology and pathology go for nought. Krishaber's arguments on the subject are, however, weak and strained, and in attempting to account for the wakefulness so unvarying an attendant, he is forced to admit that if his doctrine be true we ought rather to have somnolence than insomnia. The disease is produced by mental work and emotional excitement. It is a fair example of the *reductio ad absurdum* to contend that these factors cause the blood in the brain to be lessened.

In this connection it is interesting to refer to the remarks made by that honored physician, Dr. Amariah Brigham,* some thirty years ago :

"The general proposition which I wish to establish is made evident also from the fact that whatever excites the mind excites and stimulates the brain.

"This we know from experience in a severe headache. We perceive the pain to be increased by intense study or thinking, and that mental application determines more blood to the head. So true is it that mental excitement produces an increased flow of blood to the head, that surgeons are very careful to preserve a quiet state of mind in those whose heads are wounded. Sir Astley Cooper, speaking of such injuries, says that if any mental power remains all excitement of the brain should be avoided, and relates the following case: 'A young gentleman was brought to me from the north of England who had lost a portion of his skull just above the eyebrow. On examining the head I distinctly saw the pulsations of the brain, which were regular and slow, but at this time he was agitated by some opposition to his wishes, and directly the pulsations of the brain were increased, and became more violent, and more blood rushed to the brain. If, therefore, you omit to keep the mind free

* *Mental Exertion in relation to Health.* English edition, London: 1864, p. 20. The American editions, of which there were several, have long been out of print.

from agitation, your other means will be unavailing in injuries of the head."

"The same author mentions another similar case; that of a young man who had an opening in his skull from a wound, and through which he could see an increased action in the brain whenever anything occurred, even in conversation, to agitate the mind of the patient."

As an instance of the effect of certain kinds of emotion in causing even more serious disease than cerebral hyperæmia—though this is doubtless their starting point—the following case, detailed by Broussais, and also cited by Dr. Brigham, is of interest:

M. Thavernier, a captain in the French army, forty-two years of age, moderately stout, but well-formed, received in the middle of the Palais Royal, in May, 1815, ninety days before his death, a letter containing bad news. Whilst perusing it he remained motionless, as if thunderstruck, and the left side of his face became paralyzed and drawn to the opposite side. He was taken to Val de Grace and attended to. At this time he had complete paralysis of the arm, thigh, and leg of the right side, and was unable to speak. After using various remedies for more than two months he began to improve, and became so much better as to be able to stand up, and to speak, although with difficulty.

In this state of improvement M. Thavernier re-

ceived another letter, said to be from his wife. He read it, and instantly there occurred loss of speech, general immobility, abolition of sense, and complete apoplexy. He died in three days after the attack, and on examining the head, there was found engorgement of blood in the sinuses, and several abscesses were observed in the substance of the brain, and other marks of organic diseases.

M. Broussais considered this case to be one of chronic inflammation of the brain, induced by a moral cause.

Every now and then we read accounts of persons dropping dead under the influence of some strong emotion produced, for instance, in a court of justice. "If I am not speaking the truth may God strike me dead!" exclaims the witness. He falls to the floor as if shot, and a post-mortem examination discloses a cerebral haemorrhage, caused by a sudden overpowering strain on the blood vessels of the brain.

Some emotions doubtless lessen the amount of intra-cranial blood just as some cause the countenance to become pale; but in such cases the accompanying phenomena are very different from those of cerebral hyperæmia, although to a superficial observer there may seem to be a close resemblance.

CHAPTER VII.

TREATMENT.

ALTHOUGH, as I have said, it is rarely the case that cerebral hyperæmia spontaneously disappears, there are few affections more amenable than it to treatment. The measures which it is proper to adopt consist of those which are strictly medical and of others which may be regarded as hygienic. The indications are to relieve the hyperæmic condition of the brain by lessening the amount of arterial blood circulating through it ; to afford rest to the brain by cessation or diminution of mental work and by diversions of various kinds ; and to prevent a recurrence of the disorder. The medical agents which I have found most efficacious are :

1st. The internal administration of the bromide of sodium, calcium, lithium potassium or ammonium, and even occasionally of zinc.

The action of any one of these bromides is primarily to lessen the amount of blood in the brain, as I was the first to announce over twelve years ago.* I then said :

* On Sleep and Insomnia. New York Medical Journal, June, 1865, p. 202.

"Bromide of potassium can almost always be used with advantage to diminish the amount of blood in the brain and to allay any excitement of the nervous system that may be present in the sthenic form of insomnia. That the first named of these effects follows its use I have recently ascertained by experiments on living animals, the details of which will be given hereafter, suffice it now to say, that I have administered it to dogs whose brains had been exposed to view by trephining the skull, and that I have invariably found it to lessen the quantity of blood circulating within the cranium, and to produce a shrinking of the brain from this cause. Moreover, we have only to observe its effects upon the human subject to be convinced that this is one of the most important results of its employment. The flushed face, the throbbing of the carotids and temporals, the suffusion of the eyes, the feeling of fulness in the head, all disappear as if by magic under its use."

Of the bromides, I prefer either the sodium or calcium compounds, though there is really not much choice. Any one of them may be given to adults in doses of about fifteen grains three times a day.

2d. Ergot is scarcely less beneficial than the bromides in lessening the quantity of blood in the brain. Both it and these latter appear to act by the increased tone which they give to the coats of the arteries, and hence the diminution of their diameters.

A teaspoonful of the fluid extract (U. S. P., which I have found to be preferable to Squibb's) may be given with advantage three times a day. A better plan is to give the bromide dissolved in the fluid-extract.

3d. Digitalis is generally of great service in giving strength to the heart and arresting its disorderly movements. Eight or ten drops of the tincture may be added to each dose of the foregoing mixture.

4th. In those cases in which there are dyspeptic symptoms the administration of saccharated pepsin and charcoal with each meal will be found of great service.

5th. The application of the actual cautery to the nape of the neck is a measure of great value in the treatment of cases of cerebral hyperæmia. Care should be taken that the cauterizing instrument, which should have a platinum tip, be heated to whiteness, and that the skin be only lightly touched by it. There are several forms of apparatus by which a very intense heat can be obtained. A French instrument lately much in use in this city soon gets out of order and becomes worthless.

The actual cautery appears to have a positive and in some cases an immediate influence in diminishing the size of the cerebral arteries. This it does, doubtless, through the sympathetic nerve in the neck.

6th. Ice applied daily for a few minutes to the nape of the neck is of decided benefit. It acts through the

same agency as the cautery, and both are but better applications of a principle well known to our grandmothers—that a cold key placed on the upper part of the spine soon arrests an ordinary nasal haemorrhage.

7th. The galvanic current of low tension applied to the nucha and the head, and repeated every day or every alternate day for five minutes, as the case may require, is of great benefit. One pole should be placed at the very summit of the spine and the other some three or four inches below it. I have repeatedly seen, as I stated several years ago * the arteries of the retina contract while the current was passing in this way—an indication that a like influence was exerted on the intra-cranial vessels.

A similar effect is caused by passing the current directly through the brain, the poles being applied to the mastoid processes. A slight feeling of vertigo is experienced both when the circuit is closed and opened. Care should be taken that the current is not too intense.

Such is the medical treatment which I have found most generally serviceable in the treatment of cerebral hyperæmia during what may be called its acute stage. But occasionally we meet with cases in which the bromides are not well borne, and again, others in which ergot causes gastric and intestinal irritation.

* Spinal Irritation.—Journal of Psychological Medicine.
April, 1870.

In such instances arsenic may be substituted with advantage for either of these remedies.

Lisle* has very clearly pointed out the benefit to be derived from the administration of arsenious acid in cases of cerebral congestion, and this practice is equally applicable to the stage of hyperæmia. It appears to me that the arsenious acid is preferable to Fowler's solution, or any other arsenical preparation. I usually begin with the administration of one-fiftieth of a grain after each meal, and gradually increase to double this quantity. Lisle gives it in doses of from one fourth to the third of a grain daily, and there is no doubt, that it may be given to this extent for several weeks, or even longer, without the least danger.

When the patient has been under the foregoing treatment for a month more or less, as the case may be—at the end of which time he will ordinarily be free from cerebral hyperæmia—there is usually a state of physical debility present which ought to be counteracted. For this purpose recourse may be advantageously had to strychnia, phosphorus, iron and quinine, given either singly or in combination. If either of the two latter be administered, it should always be in union with hydrobromic acid, prepared according to Fothergill's formula.

Strychnia may be added to the solution of iron,

* *Du traitement de la congestion cerebrale et de la folie avec congestion et hallucinations, par l'acide arsenieux.* Paris : 1877.

quinine and hydrobromic acid, or may be given as extract of nux vomica alone or in combination with phosphorus. In the former case I usually employ the following formula. Rx strychniæ sul., gr. i quiniæ sul., 3*i.* ferri bromidi, 3*ss* acid. hyd. brom. (Fothergill's), 3*iv.* glycerinæ, 3*ij.* M. ft. sol. Dose : a teaspoonful in water three times a day after meals.

Should it seem desirable to administer phosphorus, as indicated by the existence of decided nervous debility, I usually make use of the phosphide of zinc. The chemical formula of this substance is Zn. P. and consequently a grain represents a little more than one seventh of a grain of phosphorus. The proper dose is therefore about the tenth of a grain. A good formula is Rx Zinci phosphidi gr. iij., nucis vom. ext. gr. x., m. ft. in pill. no. xxx. Dose : one three times a day after meals.

The hypophosphorus acid in doses of ten or fifteen drops in water three times a day, is also an eligible preparation of phosphorus.

In two cases of cerebral hyperæmia of sudden development and in which the symptoms were of great intensity, recently under my care and occurring in gentlemen whose brains were kept at more than their full measure of work, I derived immediate benefit from the application of leeches to the inside of the nostrils. In no other way can the blood be so advantageously drawn directly from the brain as by

this method. In general, however, blood-letting in any form is not required ; on the contrary, it is likely to prove injurious.

Throughout the whole course of the disease hygienic means should be persistently carried out. The food should be nutritious, digestible and ample, though not excessive in quantity. Alcohol and tobacco, if used habitually by the patient, should be restricted to moderate limits, and the former should certainly never be taken in the form of spirits—whiskey, brandy, gin, or rum. Light malt beverages and the wines of Germany, Italy or France, when used discreetly, are not in my experience injurious—on the contrary, I think that in the latter stage, when tonics are so generally applicable, they are of decided advantage; used of course with becoming moderation. Tobacco I have never seen do harm, unless indulged in to excess. Tea and coffee may safely be left to the patient's own inclinations and experience. I believe that more harm is done by suddenly breaking off a habit, even though it be somewhat injurious, than by tolerating it within due bounds. Exercise in the open air—walking, horse-back riding, or driving, is always beneficial. The same cannot be said of gymnastic contortions, which, to make them worse, are usually performed in hot rooms.

Baths are always serviceable. Whether they are to be hot, warm or cold may be left to the inclination

of the patient, or be determined by experience in each case. A hot foot-bath on going to bed certainly aids in procuring sleep by its derivative effect from the head. A cloth wrung out of hot water, and laid over the pit of the stomach, often has a like influence. The effect of a light supper, taken just before retiring for the night, is frequently very decided in its action as a producer of sleep. The *rationale* is not difficult to understand. For food to be digested, there must be an increased flow of blood to the stomach, and a part of this comes from the brain to the relief of the surcharged vessels.

Massage or "rubbing" is sometimes of service in cases of cerebral hyperæmia, but is more frequently, in my experience, productive of nervous irritability. It cannot take the place of exercise in the open air except with those who cannot walk. To see a strong, robust man submitting himself to the manipulations of the "rubber" has always struck me as an absurdity, and the same may be said of "lift cures." None of these things are more than sorry substitutes for a brisk walk.

Amusement whereby the mind is as it were got out of the rut in which it is running, are of great importance. No people take amusements with more difficulty than Americans, of whom some one has said "they are never happy unless they are miserable." The man who is harassed by daily cares and anxieties

does not get rid of them by going home and sitting down to think. He requires a complete change to turn the current of his thoughts—diversion in the fullest sense of the word. Each one must choose for himself that form which is most agreeable; but I think it may safely be said that, in general, theatrical performances of some kind, should enter largely into the systematic scheme of amusements for the subjects of cerebral hyperæmia.

And perhaps, as a permanent means of taking the mind from its laborious employment, nothing equals a “hobby”—something to which we can turn after work is over with the certainty of finding the diversion which the brain so imperatively demands. As to the kind of subject to be taken up, the taste and means of the patient must determine. If the patient is unable to take an interest in anything but his business, the case is indeed a bad one, and the possibility strong, that some more serious affection than cerebral hyperæmia will assuredly make its appearance. Certainly while the disease exists, the patient, if he expects to be cured, must consent to use his brain in a rational manner. To take medical treatment and then to continue the mental exertion which has been the prime cause of the disorder, is so absurd that it is surprising that otherwise sensible people will not see its folly—and yet, as a rule, they do not, and then are dissatisfied that they do not get well as rapidly as

they think they should or that they suffer from relapses. It would be just as sensible for a person to put a healing salve on a burnt hand and then immediately stick the hand in the fire; and the cause that induced the disease in the first instance will just as certainly induce it again if the opportunity be given.

"But," as I have said in another place,* "it is not always the case that the most positive advice on this point is followed. Men who would readily see the impropriety of walking three or four miles while suffering from an inflamed knee-joint, do not hesitate to exert a disordered brain to the extreme limit of its power. It is impossible that the action of a brain thus affected can be such as to evoke sound and healthy thoughts. It is not to be wondered at, therefore, that the subjects of cerebral congestion, who insist upon attending to their avocations and on concocting schemes for obtaining wealth or fame, should perpetrate acts which result in the loss of fortune, and the acquisition of a reputation far different from that sought."

The first requirement in the treatment of a diseased organ is almost always *rest*. Work is necessarily the result of an increased blood supply. If, therefore, the patient already suffering from the effects of too great a flow of blood to his brain, persists

* A Treatise on the Diseases of the Nervous System. 6th edition, New York: 1876, Art. Cerebral Congestion, p. 55.

in those actions which directly augment the already excessive current, the result will inevitably be an aggravation of the symptoms, and in all probability, the development of some hopelessly incurable malady to which cerebral hyperæmia is as nothing.

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